



FRIDAY, NOVEMBER 8, 1878.

### Four-Wheeled Locomotives for the New York Elevated Railroad.

The dimensions of these engines, the genesis of which was described week before last, are as follows:

Cylinders, 10x14 in.  
Driving wheels, 38 in. diameter.  
Distance from centre to centre of driving-wheels, 6 ft.  
Length of fire-box, 5 ft. 6 in.  
Width " " 2 " 10 1/4 in.  
Depth " " 2 " 8 "  
Diameter of boiler, 2 " 10 "  
100 flues, 1 1/2 in. diameter.  
Height of smoke-stack above rail, 10 ft. 0 1/2 in.  
Weight of engine with boiler and tanks filled, 23,740 lbs.

### The Influence of the Distribution of Steam on the Efficiency of Steam Engines.

BY M. MARCEL DESPREZ, ENGINEER.

[Translated from the *Revue Industrielle des Mines*, by Prof. Robert H. Thurston.]

(Continued from page 525.)

During the period of exhaust, the cylinder is in communication with the atmosphere or the condenser, and consequently is subjected to a loss of heat, which is the more

inertia which still gave these peculiar features and thus enabled me to assert with *absolute certainty* that compression may raise the steam to a pressure exceeding that in the boiler, *even in condensing engines*. I will cite, as an example, a non-condensing engine in which, in consequence of the smallness of the dead-spaces, compression raised the tension of the steam to more than 6 atmospheres while it was but 4 in the boiler. I will cite, also, a condensing engine, having a steam jacket, in which the tension of the steam at the end of the compression exceeded by about an atmosphere that in the boiler. This engine gave, at the brake, 22 horse-power. I had the interior lap of the valve cut off, and the diagrams then showed a very great reduction in the amount of compression, while the power shown at the brake, other conditions remaining unchanged, rose to 35 horse-power. Seeing such an increase of power produced by the suppression of the cushioning, I first thought that the latter must be very injurious and that the economic efficiency must be reduced in a similar proportion; since, the admission remained unchanged and the dead-spaces were exceedingly small, about 2 1/2 per cent. Well, to my great surprise, the opposite was the fact; although this engine worked under conditions which, apparently, gave no occasion for compression, as it was a condensing engine having a steam jacket and very small dead-spaces, the suppression of the cushioning had the effect of increasing the consumption of fuel per hour per horse power.

In the year 1870, Professor Bauschinger undertook a long series of experiments upon the locomotives of one of the Bavarian railroads. A certain number of these engines were

shown, acquire a tension exceeding that in the boiler. With complete expansion steam lead does not produce loss of efficiency, as has already been demonstrated. It follows that, even in an engine in which dead-spaces do not exist, we may, by compression, cushion the steam to the boiler pressure without injuriously affecting the economy of the engine, or injuring its working parts. To make this plainer, I will calculate the work and the efficiency of a perfect engine having no dead-spaces, with complete expansion, and working at a pressure of 5 atmospheres, with a cut-off at one-fifth the stroke, and having neither compression nor lead. We get the following results:

Impelling work during admission.....	10,000
expansion.....	10,100
Total impelling work.....	20,100
Total work resisting motion in exhaust.....	10,000
Useful work.....	10,100
Useful work per cubic meter of steam at 5 atmospheres.....	80,500
foot.....	16,456
If we now suppose that the distribution is so arranged that compression commences at half-stroke and that the "premature" admission takes place during 0.1 of the stroke, we have:	
Impelling work during admission.....	10,000
expansion.....	10,400
Total.....	20,400
Resisting work during exhaust.....	5,000
compression.....	8,050
lead.....	5,000
Total.....	18,050
Useful work.....	8,050
Thus the useful work is reduced to 8,050 k. m. (8,068 ft.-lbs.)	



FOUR-WHEELED LOCOMOTIVE FOR THE NEW YORK ELEVATED RAILROAD:

By the Baldwin Locomotive Works, Philadelphia.

injurious, as it is just this part which is thus cooled that is brought in contact with the prime steam when admission takes place after the exhaust ceases. There results a condensation which is often considerable in amount during the period of admission, and this is one of the ways in which the expenditure of steam becomes greater than that calculated from the volume swept through by the piston. This excess is often attributed to the entrainment of water by the steam; but this, it is acknowledged, in most cases, is insufficient to account for the still considerable excess of actual expenditure over the theoretical in cases in which every precaution has been taken to secure dry steam. This difficulty is avoided by the use of the steam jacket, which keeps the cylinder at a mean temperature nearly approaching that of the steam in the boiler. But the steam jacket has its own disadvantages, of which the most evident is that it is expensive and cumbersome. I will not enter, here, upon a discussion of the office of the steam jacket; that is an obscure subject upon which scientific men and engineers are far from being in accord. The condensation which takes place during the period of admission may be completely reduced by a compression which brings the surfaces up to nearly the temperature of the boiler and which may even exceed that temperature. It is in fact established that steam, even when it is wet at the commencement of the compression, may be considerably superheated when the compression is great. This is a result which has been proven beyond a doubt during late years both by the science of thermo-dynamics and by my own experiments. It was, long ago, remarked that, in diagrams taken from locomotives, the pressure of the steam at the end of the compression appeared to exceed that in the boiler by a considerable amount, sometimes one or two atmospheres, especially when the diagrams were taken at high speed and with short cut-off. This was attributed to a jump in the indicator piston. But I devised some years ago, in 1868, an indicator free from

fitted with Meyer's double-valve expansion apparatus, while the others had the Stephenson link. These two sets of engines were placed in the same service and their consumption of water and of fuel were determined on runs of several thousands of kilometers. The mean of all experiments showed that the consumption of water per hour and per horse-power was 16.96 k. (37.31 lbs.) in the engines having the Meyer valve and 18.33 k. (30.43 lbs.) in those which had the link motion. The consumption of fuel was also in the same ratio, and, further, both sets of engines had practically the same boilers and the same cylinders. It is seen that the Meyer engines are stated to have required 22 per cent. more fuel than those having the link, a result which is to be attributed to compression. This is indeed the conclusion drawn from these experiments by Professor Bauschinger himself, who took from all these engines a large number of diagrams, using the Richards indicator.\*

6th Phase—Premature Admission—Steam Lead.—When the piston has traversed 97.5 per cent. of its return stroke, the steam-port begins to open, and an equilibrium of pressure begins to establish itself between the boiler steam and that compressed in the cylinder during the preceding phase. The work resisting the piston during this new phase has the value  $60,000 \times 0.025 = 1,500$  k. m. (10,824 ft. lbs.)

In engines having no compression, the steam lead causes the steam from the boiler to fill the dead-spaces before the piston commences its forward stroke, so that we then have the same pressure in the cylinder as in the boiler; this is an advantage which should lead the constructors to give a greater advance than they usually do. In engines worked with compression, this lead serves to prevent the compressed steam from acquiring too high a pressure, as it might, as has been

\* I would add, finally, that the effect of compression is also to subject the parts of the engine to forces which vary gradually and do not produce shocks upon the connections; while, in engines which are not so adjusted, the sudden admission of the steam produces a real explosion, which jars the parts violently.

In calculating the expenditure, we should remark that at the instant of "premature" admission, the cylinder contains 0.1 cubic meter of steam at the pressure of 5 atmospheres as a result of its compression. The volume in the cylinder at the commencement of the expansion being 0.2 cubic meter, the volume actually furnished from the boiler is  $0.2 - 0.1 = 0.1$  cubic meter. It follows that the useful effect due to one cubic meter in this engine is equal to  $\frac{8,050}{0.1} = 80,500$  k. m. (1,702 ft.-lbs.) per cubic foot, a value precisely equal to that found for the preceding case.

Thus, in this example, in which I have designedly exaggerated the compression and the lead, and in which, to make the case still more unfavorable, I have assumed no dead-spaces, we find an economical efficiency identical with that of the perfect engine. It was easy to predict this from the theorem already demonstrated.

Résumé.—Let us now calculate the useful work and the efficiency for the engine taken in illustration in the preceding work. We have only, in doing this, to take the algebraic sum of the quantities corresponding to each of the six phases which constitute one revolution. We thus get:

Impelling Work.	Resisting Work.	Difference.
Admission.....12,000	Exhaust.....6,500	Impel.....32,900
Expansion.....15,400	Compression.....6,700	Resist.....14,700
Exhaust lead.....5,500	Steam lead.....1,500	Difference.....18,200
		32,900.....14,700

The weight contained in the cylinder at the beginning of the expansion is equal to its volume multiplied by the weight of a cubic meter of steam at 6 atmospheres in pressure, which is 3.37 kilog. (8.30 lbs.), according to Zeuner's tables, or equal to  $0.25 \times 0.27 = 0.0675$  kilog. (1.5 lbs.).

The weight of steam contained in the cylinder at the end of the exhaust is 0.22 kilog. (0.1 lb.). The weight really supplied by the boiler is, then, equal to  $0.082 - 0.22 = 0.06$  (1.33 lbs.).



The useful effect of one kilogram of steam is consequently 18,250.

$$0.6 = 30,400 \text{ kg. m. (219,366 ft. lbs.).}$$

If we make the same calculation for a perfect engine having neither dead-spaces, steam or exhaust lead, nor compression, and in which the steam is also cut off at one-fifth the stroke, we will find that the work done per revolution on one side the piston will be 21,200 kg. m., instead of 18,250, and that the useful effect of one kilogram of steam will be 32,400 kg. m.

Finally, for an engine with a perfect distribution, so-called, but having 5 per cent. clearance, like the engine which has been taken in illustration, we have:

Useful work per revolution.....	23,400
of one kilogram of steam.....	29,740

Thus the efficiency of the engine having the perfect distribution is a little inferior to that of the engine fitted with the simple valve. On the other hand, the latter develops less useful work per revolution. Still, this may be compensated by making the engine run a little faster. Finally, if we give the valve an inside lap such as will cause the pressure of the steam to be brought up to boiler pressure by compression, we find:

Useful work per revolution.....	17,450
effect of 1 kilog. steam.....	30,500

Thus, even in the last case in which the compression occurs during 0.4 the return stroke of piston, the economy remains 30,500 kg. m. per kilogram of steam. This example is interesting because the tension of the steam at the commencement of the steam lead being precisely 6 atmospheres, the volume of steam expended at this pressure per revolution is obtained immediately by deducting the sum of the volumes corresponding to the dead-space and the steam lead from the volume at the end of the period of admission: it is, then:

$$0.20 + 0.05 - (0.05 + 0.025) = 0.175.$$

The useful work of one cubic meter of steam would be, in this case, equal to  $\frac{17,450}{0.175} = 100,000 \text{ kg. m.}$ , while the engine which has been called perfect would give 106,000 kg. m., and the engine with perfect distribution but with dead-spaces would give 97,000 kg. m.

Thus, even when the expansion is not complete, compression increases the useful effect. These results show plainly that the extreme complication of mechanism devised by Corliss and his imitators is not repaid by any economical advantage, and that the extraordinary rage to which they have given rise among builders is not justified. These results plainly indorse the adoption of the link on locomotives, and do not permit the expectation that the double valves, like those of Meyer, of Polonceau, or of Guinotte, can compete successfully with it even from the purely economical point of view, while they are decidedly inferior, especially the latter, which has two links and more than twenty joints, in respect to simplicity, durability and maintenance. The double-valve apparatus would have no use except where the expansion is carried in the single cylinder very much farther than is to-day customary, but these considerable rates of expansion can only be adopted when the steam pressure is greatly increased, and it is probable that it will then be found that the expansion will be carried on in two cylinders, as has been done for several years in the economical marine engines known in England as "Compound."

But are these considerable rates of expansion more economical than moderate expansion? That imperfect theory which takes no note of the conductive power of the wall of the cylinder says yes; experiment replies no! and if proof is desired, I will cite the results obtained by the longest, the most conscientiously made, and the most skillfully conducted experiments ever made on steam engines. These are Hirn's, who, for twenty-five years, has devoted his talent as an investigator, and his knowledge, which is of the highest order, to the experimental verification of the laws of the mechanical theory of heat. His experiments have been made,

1st. On an engine of the Woolf (compound) type which ran 15 years, using saturated steam and consuming 12.25 kilog. (36.95 lbs.) of water per hour per horse-power. This expenditure was reduced to 10 kilog. (22 lbs.), by throwing off the small cylinder and working with superheated steam and expanding four times.

2d. In an engine without steam jacket, having a single cylinder and expanding in the ratio of one to four, the consumption of steam per hour and per horse-power was found to be 14.15 kilog. (33.45 lbs.) with saturated steam, and this was reduced to 10 kilog. (22 lbs.), with steam superheated to 250 deg. (482 deg. Fahr.)

3d. The double-cylinder Woolf engine having been replaced by a single cylinder without steam jacket, the consumption, with superheated steam of 4.5 atmospheres pressure, fell to 8.53 kilog. (18.17 lbs.) of water per hour per horse-power with an expansion of 1 to 4.

4th. In the high-speed engine, 93 revolutions per min., expanding steam four times from a pressure of 4.5 atmospheres, and superheated to 250 deg. (482 deg. Fahr.), the consumption fell to 8.2 kilog. (18.04 lbs.) of steam per hour and per horse-power.

5th. Finally, in an engine working steam at 5 atmospheres pressure and at a temperature of 245 deg. (473 deg. Fahr.), expanding 6 times, the consumption fell to 7.5 kilograms (16.5 lbs.) of steam per hour per horse-power.

In engine No. 4, the throttle-valve being nearly closed and with very little expansion, the consumption was only raised to 9.2 kilog. (20.34 lbs.) per hour per horse-power; engine No. 5, under the same conditions, used, with almost no expansion, 10 kilog. (22 lbs.) per hour per horse-power.

All these results were obtained during long periods of time; the engines developing a uniform power which was measured by the brake. They were all condensing engines. The last three were provided with a valve-gear having four

valves, with the express object of reducing the clearances and the dead-space, as well as to avoid bringing the prime steam en route from the boiler in contact with the passages traversed by the exhaust steam. All were without jackets, as M. Hirn has shown that, with superheated steam, jackets are entirely useless.

It is seen that M. Hirn has secured by these arrangements an efficiency superior to what has been usually obtained in practice, and that he has done this with very moderate expansion and pressures, merely by impeding the free transmission of heat across and through the walls of the cylinder. Had he thought of the employment of compression, the use of four valves arranged to reduce the dead-spaces to a minimum would have been unnecessary.

M. Hirn concludes that the greatest advance to be secured in the steam-engine is that of making practicable the use of superheated steam. I will now give a last example of the influence of compression in a condensing engine.

In an engine working steam of 5 atmospheres pressure, having a condenser in which the pressure is 0.2 atmosphere and dead-spaces measuring 0.01, I will assume that the lead measures also 0.01, and that we arrange the compression to bring the back-pressure up to 5 atmospheres. I will assume, finally, that the admission continues through 0.09 of the stroke. In order that the compression shall raise the back-pressure from 0.02 to 5 atmospheres, it must compress the exhaust steam 25 times. Thus the sum of the dead-spaces and the steam lead being equal to 0.02, the compression must commence when the piston has still 0.49 of its path to traverse.

We thus obtain the following results:

Admission.....	4,500	Exhaust.....	1,020
Expansion.....	11,560	Compression.....	3,220
Steam lead.....	500		
Impelling work.....	16,060		
Resisting work.....	4,740	Resisting work.....	4,740
Useful work.....	11,320		

Thus the useful work per revolution on each side the piston will be 11,320 kg. m. (81,885 ft.-lbs.). The corresponding expenditure of steam of 5 atmospheres pressure will be  $(0.09 + 0.01) - (0.01 + 0.01) = 0.08$  cubic meter (280 cu. ft.).

The useful work of one cubic meter of steam at 5 atmospheres pressure is thus equal to  $\frac{11,320}{0.08} = 141,500 \text{ kg. m.}$  (= 29,000 ft.-lbs. to the foot).

Making the same calculations for the same engine without compression, we find:

Useful work per revolution on each face.....	14,060 (3.5 ft.)
Expenditure of steam at 5 at. pressure.....	0.10 m.
Useful effect of one cu. meter.....	140,600 kg. m.
foot.....	28,700 ft.-lbs.

This is practically the same useful effect as where the compression began at half-stroke. But I believe that there is some advantage in the first engine, arising from the superheating effect of the compressed steam upon the walls of the cylinder.

I might consider other examples showing the slight effect of wire-drawing upon the useful effect; but it is easy to perceive this fact by noting that unlike what occurs with water, an incompressible fluid, the weight of steam contained in the cylinder during admission is constantly proportional to the tension of that steam, so that consequently, except with variation of temperature, the pressure of the steam being diminished, the expenditure is similarly reduced. Indeed, the introduction of a small quantity of water with a mass of steam about to expand produces an effect similar to that of the steam-jacket. It is, moreover, easy to see that the injurious effect of wire-drawing is practically unimportant when the pressure in the cylinder at the beginning of the stroke is, by a properly-regulated compression, made equal to that of the steam in the boiler. I have made the calculations supposing the pressure to fall from 8 to 6 atmospheres from the beginning of the stroke to the point of cut-off (at 0.2 stroke), and they leave no doubt in that respect.

Table C† gives the useful work and the economical efficiency of an engine having a distribution effected by the simple valve described on page 9. It will be seen on comparison with Table A, of the engine provided with a so-called perfect distribution, that the latter exhibits no economical advantage over the first.

I am therefore at liberty to conclude by asserting: The best of the methods of distribution is the simplest.

[NOTE.—The preceding paper contains a very excellent plea in favor of the simple three-ported valve; and, although not fully agreeing with its author on some points incidentally referred to, its translation was considered likely to prove useful to American railroad engineers and constructors.—R. H. THURSTON.]

## Contributions.

### The Paris Exhibition—Locomotives of the Austrian State Railroad Company.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The Imperial Royal Private Austrian State Railroad Company exhibits in Paris a portfolio of very complete drawings of its locomotives, and also an album with sketches and dimensions of all locomotives that are still in service on its lines, excepting a few types which are being reconstructed. There is very little in their construction that could serve our designers as an example for improvement in locomotive building, owing partly to the different character of our roads and our fuel, and partly to the superior inventive and practical talent of Americans. It will not be, however, without interest to many of our readers to know what styles of locomotives are used to work the traffic of an important

European railroad system, such as is that of the Austrian State Company.

The album contains dimensions of 594 locomotives, which are divided into three principal classes, namely, 55 for passenger, 200 for mixed, and 339 for freight trains. There are also differences in design and dimensions in locomotives in each of the classes, giving in all some 34 types. All the old European railroad companies thought little of the importance of uniformity in their locomotives, and for the sake of improvement have been constantly adding new types, without consulting their repair shops about the increase in the repairing expenses thus caused. The tendency is now, on some lines, to reduce the great variety to a few necessary standards.

The following extracts from the album referred to will suffice to give characteristics, and show the main differences in locomotives of the Austrian State Railroad.

There are 12 passenger express locomotives (this style does not exist in America, or at least there is not so striking a difference between express and other passenger locomotives). Their principal object being speed, they have comparatively large heating surfaces, large wheels, and small tractive power. They are six-wheeled, with all axles placed between the fire-box and the cylinders, giving thus a short wheel-base, and leaving considerable weight overhanging. They have only one pair of heavily loaded drivers. The four running wheels are in front; their axles are rigid. The frames and the cylinders are outside, and the valve-motion inside of the wheels. Each axle carries an elliptic spring above it, and no equalizing levers are used. The principal dimensions of eleven of these locomotives are as follows:

Diameter of cylinders.....	15.55 in.
Stroke of pistons.....	24.88 "
Diameter of boiler, outside.....	4 ft. 0 1/4 in.
Number of flues.....	160
Diameter of flues, outside.....	2.04 in.
Length of flues between plates.....	14 ft. 6.2 in.
Heating surface of the fire-box.....	75.34 sq. ft.
" " total.....	1,319.7 sq. ft.
Area of grate.....	15.93 sq. ft.
Diameter of chimney.....	16.5 in.
" driving-wheels.....	6 ft. 8.9 in.
" running-wheels.....	4 " 1.75 "
Wheel-base.....	11 " 4.89 "
Length of locomotive over all.....	27 " 5.25 "
Weight of locomotive, empty.....	33.27 tons.
" loaded.....	36.70 "
" on drivers, loaded.....	14.66 "

Effective steam pressure in boiler is 7 atmospheres, or 102.55 lbs. per square inch. The tractive power of these locomotives, calculated by the formula  $\frac{D^2 S}{D}$ , is 74.2 lbs. for each

pound of effective pressure per square inch on the pistons; they are capable of hauling 88 tons, exclusive of their own and the tender's weight, on a grade of 1/15 (35.5 feet per mile), at a speed of 28.2 miles per hour.

The twelfth express locomotive is peculiar in this respect, that it has four instead of two cylinders, otherwise being exactly the same as the 11 above described. It was designed by Mr. John Haswell, with the special object of running with the utmost steadiness; and this was accomplished. Two cylinders (see fig. 1) act on each driving-wheel; their pistons are connected to crank-pins diametrically opposite each other, and the distribution of steam to opposite ends of each pair of cylinders is effected by only a single slide-valve. The diameter of each cylinder is 10.86 in., the stroke being 24.88 in.

The four-wheel-coupled passenger locomotives, although having more weight available for the useful adhesion, are lighter, have smaller wheels and heating surfaces; their object is to haul heavier trains at a reduced speed. They are also six-wheeled (see fig. 2). The weights on the driving-wheels are equalized, spiral springs being placed between the two drivers on each side of the locomotive. The dimensions of four of them are following:

Diameter of cylinder.....	15.55 in.
Stroke of pistons.....	23.85 "
Diameter of boiler, outside.....	3 ft. 9.6 in.
" " vertical.....	3 " 8.1 "
Number of flues.....	129
Length of flues between plates.....	14 ft. 5.2 in.
Heating surface of the fire box.....	67.82 sq. ft.
" " total.....	1,065.66 "
Area of grate.....	11.51 "
Diameter of chimney.....	15.55 in.
" driving-wheels.....	5 ft. 8.42 in.
" running-wheels.....	3 " 6.54 "
Wheel-base.....	10 " 11.08 "
Length of locomotive over all.....	28 " 1.28 "
Weight of locomotive, empty.....	29.9 tons.
" loaded.....	33 "
" on drivers, loaded.....	24.5 "

Effective steam pressure in boiler is 6.27 atm., or 91.85 lbs. per square inch. The tractive power is 87.2 lbs. for each pound of effective pressure per square inch on the pistons. They are capable of hauling 209 tons, exclusive of their own and the tender's weight, on a grade of 1/15 (52.8 feet per mile), at a speed of 10.54 miles per hour.

The third characteristic type of passenger locomotive is a tank locomotive, of a construction never used in America, and known as the Engerth system. The design will be understood best if we imagine a four-wheel-coupled locomotive whose two axles are placed under the forward end of the boiler, with inside frames, and a tender on a separate 6-wheeled vehicle, with outside frames, so arranged that it can be pushed under the locomotive boiler, the fire-box taking position between the two first tender axles, or above one of them. The two frames are then coupled by a pivot-bolt in front of the fire-box (see plan in fig. 3). This arrangement gives flexibility to the long wheel-base, necessary for running on curves; but it is said to require frequent and difficult repairs, and thus it is now disappearing from some of the European railroads.

The cylinders, being inside, have to be placed high enough and be inclined, in order to make the cross-heads clear the first axle. Each axle carries a set of spiral or elliptic springs

\* Diameter of flues is the same on all locomotives of the Austrian State Railroad.

† These tables are omitted.—TRANSLATOR.



and the weights on them are not equalized. There are 33 of these locomotives, their dimensions varying more or less. The following dimensions are of the type of 1863:

Diameter of cylinders.....	18.57 in.
Stroke of pistons.....	21.70 "
Diameter of boiler, outside.....	3 ft. 11.7 in.
Number of flues.....	157
Length of flues between plates.....	14 ft. 6.2 in.
Heating surface of the fire box.....	81.37 sq. ft.
Area of grate.....	1.303.11
Diameter of chimney.....	16.49 in.
" driving-wheels.....	5 ft. 8.4 in.
" running wheels.....	3 ft. 1.3 in.
Wheel-base.....	26 ft. 3.28 in.
Total length of locomotive.....	37 ft. 5.06 "
Weight of locomotive, empty.....	39.9 tons.
" loaded.....	53.68 "
Weight on driving wheels, loaded.....	23.7 "
Capacity of water tank.....	1,850 gals.
" coal bunker.....	116.5 cub. ft.
Effective boiler steam pressure.....	102.5 lbs.

The tractive power is 91.4 lbs. for each pound of effective pressure per square inch on the piston. They can haul a train of 396 tons, exclusive of their own weight, on a grade of 2 1/8 (21.1 feet per mile), at a speed of 14.96 miles per hour.

Locomotives of the second class, called mixed, are, as their name indicates, intended for a duty which is intermediate

The tractive power is 115.9 lbs. for each pound of effective pressure per square inch on the pistons. Their capacity is 198 tons, exclusive of their own and tender's weights on a grade 1 1/8 (52.8 feet per mile), at a speed of 12.4 miles per hour.

The 93 tank locomotives for mixed trains are all alike, and of the same design as those shown in fig. 3, excepting their dimensions, which are as follows:

Diameter of cylinders.....	16.61 in.
Stroke of pistons.....	22.70 "
Diameter of boiler, outside.....	4 ft. 4.36 in.
Number of flues.....	180
Length of flues between plates.....	13 ft. 10.9 in.
Heating surface of fire-box.....	82.82 sq. ft.
Area of grate.....	1.425 "
Diameter of chimney.....	17.32 in.
" driving-wheels.....	5 ft. 2.2 in.
" running-wheels.....	3 ft. 1.31 in.
Wheel-base.....	27 ft. 3.7 in.
Total length of locomotive.....	38 ft. 5.4 in.
Weight of locomotive, empty.....	43.45 tons.
" loaded.....	58.39 "
Weight on driving wheels, loaded.....	27.05 "
Capacity of water-tank.....	2,085.6 gals.
" coal-bunker.....	139.5 cub. ft.
Effective boiler steam-pressure.....	131.8 lbs.

The tractive power is 101 lbs. for each pound of effective

Diameter of boiler, outside.....	3 ft. 9.47 in.
Number of flues.....	121
Length of flues, between plates.....	11 ft. 3.8 in.
Heating surface of the fire-box.....	60.27 sq. ft.
Area of grate.....	796.55 sq. ft.
Diameter of chimney.....	14 "
" driving-wheels.....	15.35 in.
" running wheels.....	3 ft. 7.5 in.
Wheel-base.....	8 ft. 6.3 in.
Total length of locomotive.....	26 ft. 5.8 in.
Weight of locomotive, empty.....	30.47 tons.
" loaded.....	35.86 "
Capacity of water-tank.....	607 gals.
" coal-bunker.....	52.97 cub. ft.
Effective boiler steam pressure.....	131.8 lbs.

The tractive power is 110 lbs. for each pound of effective pressure per square inch on the pistons. Their capacity is 187 tons, exclusive of their own weight, on a grade of 1 1/8 (52.8 feet per mile), at a speed of 9.3 miles per hour.

[TO BE CONTINUED.]

#### Curve Resistance and Wheel-bases on Standard and Narrow Gauges.

BELLWOOD, Oct. 28, 1878.

TO THE EDITOR OF THE RAILROAD GAZETTE:  
Although I had thought to let the question of "Curve Resistance" rest with my letter of the 12th inst., I cannot

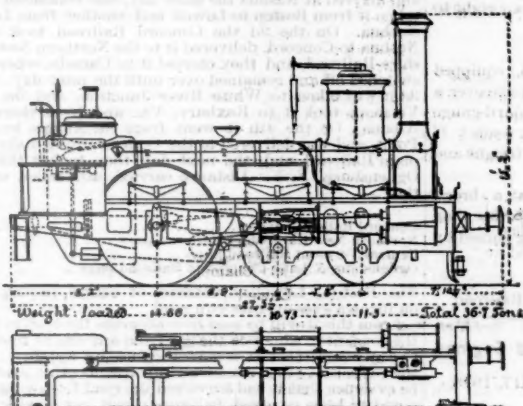


Fig. 1.

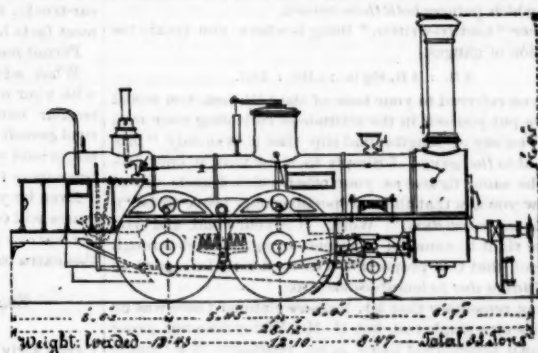


Fig. 2.

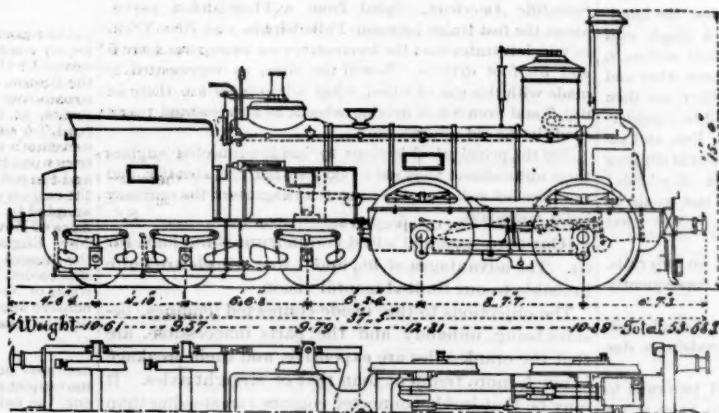


Fig. 3.

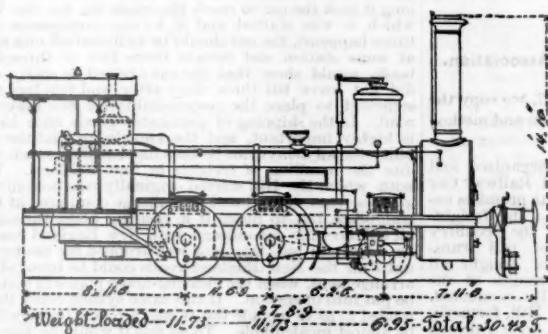


Fig. 4.

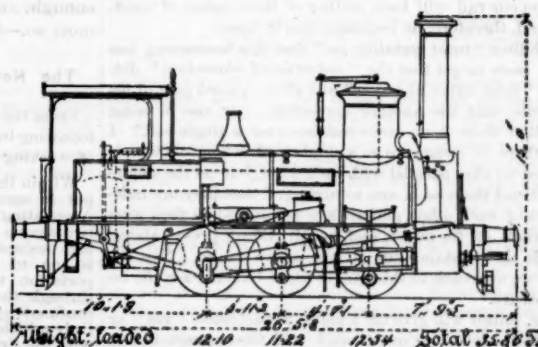


Fig. 5.

between that of the freight and the passenger engines. Of the 200 which the company has in service, 69 are six-wheeled, 38 eight-wheeled, and 93 ten-wheeled—the latter are tank locomotives. There is also one six-wheeled switching locomotive counted with this class. All have four coupled wheels. Excepting the number of wheels, there is apparently no other difference between the six and the eight-wheeled; they are divided into several types, being built at various times.

Fig. 4 represents the type of 20 locomotives built at the company's shops in Pesh, between 1869 and 1876; their principal dimensions are:

Diameter of cylinders.....	15.55 in.
Stroke of pistons.....	23.85 "
Diameter of boiler, outside.....	3 ft. 8.6 in.
Number of flues.....	140
Length of flues between plates.....	13 ft. 10.4 in.
Heating surface of the fire-box.....	79.65 sq. ft.
Area of grate.....	1.116.24 "
Diameter of chimney.....	15.31 in.
" driving-wheels.....	4 ft. 1.76 in.
" running-wheels.....	2 ft. 9.3 in.
Wheel-base.....	10 ft. 9.6 in.
Total length of locomotive.....	27 " 8.95 "
Weight of locomotive, empty.....	27.06 tons.
" loaded.....	30.42 "
Weight on driving wheels, loaded.....	23.46 "
Effective boiler steam pressure.....	102.5 lbs.

pressure per square inch on the pistons. Their capacity is 440 tons, exclusive of their own weight on a grade of 1 1/8 (21.1 ft. per mile), at a speed of 14.96 miles per hour.

To the third class belong freight locomotives, which are numerous and of different types. There are seven small saddle-tank locomotives, with six wheels coupled of 3 ft. 1.4 in. diameter, and with inside cylinders of 11 or 12.44 in. diameter and 17 in. piston stroke; their total heating surface is 593 or 652 square feet; they weigh each 30 tons.

Until 1875 the company did not have any special switching engines, using their old locomotives for that purpose; but as the business increased it was found advisable to construct a special type for switching service, and 17 locomotives were built at the company's shops. Their design is represented in fig. 5. Like all the latest locomotives of this company, they use small coal for fuel. The fire-boxes are of Becker's system (illustrated in the Railroad Gazette Sept. 20, 1878). The tanks are placed below the boilers to lower the centre of gravity, and the object of this is to reduce the wear of switches and locomotives. They burn 62.37 lbs. of the Klado, 51.71 lbs. of the Steyerdorf coal per hour. Their principal dimensions are the following:

Diameter of cylinders.....	15.74 in.
Stroke of pistons.....	18.11 "

let some things in your comments, in your issue of the 18th inst., remain unanswered.

In your correction (what you corrected was nearer correct than your "correction," and you have only made the error of your position more manifest by your "correction" than it was prior to that) you excuse your apparent mistake by pleading hasty reading and writing. It is well that you have put in this plea, as it seems incredible that you would, in a well-digested and carefully-considered letter, commit so many glaring inconsistencies as you have. Still questions like this should not be answered in such a manner, and conclusions reached that a more careful and considerate reading and study prove erroneous.

In your "correction" you say: "The difference in the resistance on wide and narrow-gauge curves, other things being equal, is due, we believe, entirely and on to the greater difference in the length of inner and outer rail in the one case than the other. If 'other things' (which I suppose means wheel-base) 'were equal,' I admit that the 'only difference' in resistance would then be that 'due to the difference' in rails; but, as you know, and as we all know, 'other things' are not equal, and that if 'other things' are not equal, the resistances due to 'other things' are not



equal; now, if the resistances due to "other things" are not equal, the resistances on one gauge must be less than the other, and as you say yourself, "Mr. Ramsey says that the flange resistance on curves with a truck having a wide spread is greater than it is if the wheels are nearer together. No one doubts that" (the italics are mine). Now does any one doubt that the wheel spread is shorter on the narrow than it is on the broad? You do not, because you try to show that it can be made just as short on the broad as it is on the narrow. Now—to sum up—there is:

1st. A difference in the resistances due to length of rails.  
2d. A difference in the resistances due to length of wheel spread.

3d. As these two causes (rails and spread of wheels) produce all the resistances due to curves (centrifugal force being provided for as described in my previous letters), there must be a difference in the total, or all the resistances due to curves.

4th. As these resistances are in the first cause "proportional to the gauge" (you will doubtless recognize your own words), and in the second, proportional to the spread of wheels, there must be a less total resistance on the narrow-gauge, which reduces both these causes.

Another "hastily-written" thing is where you tackle the proportion of gauges.

3 ft. : 4 ft. 8½ in. :: 10° : 15.7.

Had you referred to your issue of the 11th inst. you would not have put yourself in the attitude of ridiculing your own rule. You say of longitudinal slip that it was only "proportional to the gauge." Simply to show that it only produced the same figures as your other rules, I made use of it. Now you say that these proportions only prove to be "a *reductio ad absurdum*." Well! It is your child, and you have the right to name it; but please to get this fact through your head, that this proportion was used only in regard to the resistance due to longitudinal slip.

I do not remember that Mr. Ramsey claimed there was no resistance on a single rail, but if Mr. Editor does not prove by his own article that there is no resistance on a "single rail" with a "single wheel" I am mistaken. You say, "If a single pair of cylindrical wheels is rolled on a curve, if the axle is kept radial to it, the only resistance due to the curve is the longitudinal slipping of one of the wheels." On a single rail there would be no diagonal slipping, because the longitudinal component does not exist; that is, on a single rail there would be no resistance due to longitudinal motion.

"But if two wheels are placed in line with each other and their axes are held parallel to each other, and they are then rolled on a single curved rail, the resistance will be considerably greater on the curve than on a straight line, and yet there is no longitudinal slipping, but only lateral slipping and flange friction, and with a given spread of wheels" (there comes that other thing, etc.), "the two last would be the same on a single rail as on a 6 ft. gauge." Now what does this show? It shows:

1st. That a pair of wheels on a single axle, on two rails, has neither lateral slip nor flange friction, and consequently no resistance due to these causes.

2d. That a pair of wheels on two axles, on a single rail, has no longitudinal slip, and consequently no resistance due to this cause.

3d. If it requires one axle, two wheels and two rails to produce longitudinal slip, and two wheels, two axles and a single rail to produce lateral slip and flange friction, one wheel on one rail will have neither of these causes of resistance, and, therefore, no resistance due to them.

Mr. Editor "must certainly see" that this boomerang has hit the same target that the "*reductio ad absurdum*" did, and he "must either abandon" the above quoted part of his comments, and file another correction, "or else he must assert that there is no curve resistance on a single rail." I admit there is resistance on a single rail when two wheels are fixed on axes parallel with each other, but on the single-rail railroad the wheels are so arranged that they are independent of each other, and always accommodate their axes to the radii of the curve, and, as Mr. Editor proves above, there is no resistance due to the above causes. Now the nearer we approach to this single wheel-base the less the resistances are.

If Mr. Editor will give me a plain unvarnished "yes" or "no" to the following questions, I will then permit him to make his claim for allowances, due to his broad-gauge trucks built on narrow-gauge principles, and admit that as he shortens the wheel-base of the former he reduces the difference in the resistances due to lateral slip and flange friction; my questions are these:

1st. Is not the resistance due to longitudinal slip proportional to the gauge?

2d. Is not the resistance due to lateral slip and flange friction due to the wheel-base, and proportional to the wheel-base?

A plain, unvarnished answer to these questions is all I ask.

As I do not wish to take up too much of your valuable space, and as enough figures have already been given, I will simply state that experiments that I have made at my leisure on the grades and curves of the Bell's Gap Railroad, while not far enough advanced and tested to give their results as perfectly correct and authentic, have, to a remarkable degree, corroborated my claims and calculations; for instance, I have found that the resistance on a 28° curve is about 8 or 8½ lbs. more than on a tangent; the broad-gauge formula would require 14 lbs., while the formula of a certain prominent railroad would give 15½ lbs. Tests that I propose making may change these figures, but I do not think they will.

I admit that you can place the centres of two 33-in. wheels within 37 inches of each other and have 1¼ inch

clearance between flanges, but I do not think I could put a 14-inch bolster in that space; you might do so, as you say the difficulty is only imaginary, but I am positive that I cannot. That is about the only difficulty that I see in getting a 37-inch base with 33-inch wheels; perhaps you intend using "imaginary" bolsters. This may be "another case of lobster-eating" on my part, but I think it is a case of "bolster"-eating on yours.

"Singular, narrow-gauge people cannot grasp this idea." Again, you speak of using the same size axles on your mythical broad-gauge truck as are used on the narrow-gauge. Do you mean to assert that a piece of iron whose supports are 6.25 ft. apart will support the same load that it would with the supports 4 ft. apart?

This is another "idea" that "narrow-gauge people cannot grasp;" and I do not think that any broad-gauge person (except Mr. Editor) can either. As to this hermaphrodite road, neither broad gauge nor narrow, that you propose building (on paper) to compare with a road that is an "existing fact" (and there are plenty more like it), whenever you produce a single road like it (without going back to our grandfathers' days), or a car-builder who will build your mythical car-trucks, then, and not till then, will I admit your right to meet facts by theories.

Permit me to ask you a few questions.

What advantage would a broad-gauge road, equipped with your narrow-broad-gauge trucks and cars, have over a regular narrow-gauge road? Would any standard-gauge road permit you to run your light cars over their roads? If not, would you not be forced to transfer all your freight and passengers?

Even by your own admissions, you show that a broad gauge will cost something more to build and operate than the narrow gauge would. Now, if there is nothing gained by this extra outlay, it is thrown away.

JOS. RAMSEY, JR.,

Engineer and Superintendent Bell's Gap Railroad.

#### Large Driving-Wheels and Inside-Connected Engines.

ROCK ISLAND, Oct. 17, 1878.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Perhaps you noticed an article in a recent number of the *Scientific American*, copied from a Philadelphia paper, about the fast trains between Philadelphia and New York, in which it states that the locomotives on these runs have 5 and 5½-foot drivers. Now if the time, as represented, is made with this size of wheel, what advantages are there in 6½, 7 and even 8-foot driving-wheels, as I understand many roads in the old country use?

Are the principal objections to inside-connected engines their unhandiness to get at? Do they not run steadier, and are they not easier on the track than engines of the ordinary build nowadays?

[Our correspondent's first conundrum is too hard for us. The advantages of 6½ and 7 foot wheels are quite invisible to our limited mental vision.]

The objections to the inside-connected engines, besides being unhandy and the parts inaccessible, are that the crank-axes are expensive, and their breakage is much more frequent than that of straight axles. It may be that inside-connected engines run steadier than those with outside cylinders, but the latter run steady enough, and there is no use in having them run any more so.—EDITOR RAILROAD GAZETTE.]

#### The New England Car-Accounting Association.

From the Boston *Sunday Herald* of Oct. 27, we copy the following interesting account of the organization and method of working of this new association:

Within the last six months there has been organized and put in successful operation the New England Railway Car Accounting Association, and the result thus far promises entire success for the plan adopted for its work. The freight business of the various railroads of the country is one of the most difficult branches of rail transportation to understand, but shippers of freight all through the land are fully aware of the results of the confused systems under which it is usually conducted. Only a little more than a year ago, Mr. E. B. Hill, formerly with the Erie road, and thoroughly familiar with railroad business, undertook to perfect a system by which the different railroads should know to a certainty just the distance traveled by their freight cars, either on their own or other roads. The general public will appreciate the magnitude of the task from the fact that the cars of the various roads (in number about 40,000) are used very indiscriminately by each other, and frequently traverse New England from end to end, and across the country in all directions, without being returned to the road from which they started on their pilgrimage. By the system adopted by Mr. Hill any car entering the limits of New England, or running over any of the roads within these six states, is traced in its daily wanderings as surely as if the road owning it employed a special agent for each of its cars.

#### THE PLAN OF THE SYSTEM.

Mr. Hill's plan is simply to concentrate the work now done by each road separately in one central office. The only additional labor necessary to enable the system to work satisfactorily is for the conductor of each freight train to make his train report in duplicate, the duplicates to be collected in the superintendent's or general freight agent's office, and forwarded daily to this central office. These conductors' reports state the number of each car in the train, and the road to which it belongs, the point of its reception, and the point at which it was delivered up, whether at its final destination, or its delivery to another corporation. This, it will be seen, gives a history of the cars of each train, so far as its daily travel is concerned. Each conductor makes a separate record, and the idea of Mr. Hill's system is to consolidate these reports in such a way that not only the returns made should be compactly tabulated, but that this tabulation shall show any possible omission in such returns.

Each road in New England, whether represented in the association or not, has a record book devoted especially to the travel of freight cars of that particular road, a new book being started each month. The pages are so ruled that each car owned by that particular road has a series of blank spaces on one line across the page corresponding to each day of the month. Every station in New England is known to the clerks by either a numeral, a figure, or a combination of both so arranged that no confusion is possible in the use of the various abbreviations. To explain the system the following blank will answer, covering the movement of one car for five days:

BOSTON, LOWELL & NASHUA RAILROAD.

October.

NO. OF CAR.	1	2	3	4	5
3808	B L 2	2 C n 66	n 66 K R sa	sa 56	56 og

The experienced clerk of the association would interpret this as follows:

Boston, Lowell & Nashua car No. 3808 left Boston Oct. 1, and arrived at Nashua the same day, one conductor having taken it from Boston to Lowell and another from Lowell to Nashua. On the 2d the Concord Railroad took it from Nashua to Concord, delivered it to the Northern New Hampshire Railroad, and they carried it to Canada, where it was switched off and remained over until the next day. On the 3d it was taken to White River Junction, and the Central Vermont took it to Roxbury, Vt., and from there to St. Albans. On the 4th it went from St. Albans to Rouse's Point, and was delivered to the Ogdensburg & Lake Champlain Railroad, and, the next day, they took it through to Ogdensburg, N. Y. Distance carried, 407 miles, of which the

	Miles.
Concord Railroad pays.....	35
Northern New Hampshire Railroad pays.....	70
Central Vermont Railroad pays.....	144
Ogdensburg & Lake Champlain Railroad pays.....	118

The Boston, Lowell & Nashua, of course, paying nothing on its own cars over its own road.

From this it will be seen how accurate the system is, for if the conductor who took the car from any one of these points to any other failed to report the fact its appearance upon the records of other conductors upon connecting roads would be evidence that it had traversed the road from which no report had been received, balloon transit not having as yet been applied to freight transportation.

#### THE ADVANTAGE TO THE ROADS

In the association is easily seen, as the value of a freight car is only made of profit to a corporation by the return, received by the company, for its use. In the case cited above, the Boston, Lowell & Nashua road would collect from the roads over which its car passed, mileage to the amount stated, at the rate fixed by the Boston, Lowell & Nashua road, for such use of its cars. The reports, made by the association's clerks, are the basis for the credit and debit entries upon the books of the several railroads receiving them, and are not open to question, as they might be if made by the employees of the several roads. The system has been adopted by roads representing 60 per cent. of the entire tonnage of New England, and it is fully expected that all the New England roads will enter into it before the end of the present year. It is conceded that this general system has superseded all the systems formerly in use by the several roads of New England, none of the old plans being comprehensive enough to make an accurate rendering of all the car service possible.

#### THE SHIPPERS' INTERESTS

are also advanced by the labors of this association, as the movement of all freight can be traced, and when delays occur, the point at which the delay occurred can be fixed beyond any question. For instance: If a car leaves some point on the Maine Central road, and is consigned to some party at the West, the association's report would show just how long it took the car to reach the trunk line for the West, for which it was started, and if, by any carelessness (as sometimes happens), the car should be switched off on a side track at some station and remain there two or three days, the books would show that the car arrived on such a date and did not leave till three days after, and this fact would be sufficient to place the responsibility for the delay on that road. In the shipping of perishable goods such knowledge is highly important, and the knowledge that the responsibility for all delays can be thus fixed will do much to expedite the handling of freights in New England. The idea with which Mr. Hill started originally was not only to have all these records kept and the mileage computed at this central office, but to make it a clearing house through which all balances for car-mileage with New England roads could be adjusted; but this idea was dropped for the time being, until all the New England roads could be brought into the arrangement, when the clearing-house plan will undoubtedly be put into operation. If this same system could then be extended so as to include the Western roads, the benefits would be almost incalculable. To do this it would be necessary to establish a clearing house at each of the great railroad centres—Philadelphia, Buffalo, Cincinnati, Chicago and St. Louis, and at such other points West and South as might be deemed expedient. Many prominent railroad men are of opinion that this will eventually be done, and that all freight and ticket balances, as well as the car service, will be settled in this way.

#### THE HEADQUARTERS

of the association are in the upper part of the Lowell Railroad station, the large rooms unoccupied by the railroad company affording ample accommodation for the twenty-two clerks employed by Mr. E. D. Hill in keeping the accounts of the company. The general oversight of the association is intrusted to an executive committee of three—Messrs. William Bliss, General Manager of the Boston & Albany Railroad; George W. Bentley, General Manager of the Central Vermont Railroad; and A. A. Folsom, General Superintendent of the Boston & Providence Railroad, all of whom, it is needless to say, fully indorse the system and its workings. The complications incidental to the business of the association can be more fully realized from the fact that there are 2,145 railroad stations in New England where freight cars can be left and taken up, and any car bound for any of these stations can be followed accurately by this company. The amount of work done is shown somewhat from the fact that the company has reported, on an average, nearly fifteen million miles of mileage each month since it was organized on the 1st of May. Thus far the system has proved a great success, and the energy and perseverance of Manager Hill in arranging all the perplexing details incidental to starting such an undertaking have been well rewarded.



### Companies that have Adopted the Revised Rules for Interchange of Cars.

The following is a completed list of railroad companies that have adopted the revised rules governing the interchange of cars dated Niagara Falls, June 12, 1878, and published in the *Railroad Gazette* of June 21. A list which we published Sept. 27 had 31 names; this has 17 more:

Allegheny Valley.  
Baltimore & Ohio.  
Boston, Barre & Gardner.  
Chicago & Michigan Lake Shore.  
Canada Southern.  
Central Vermont.  
Chicago & Alton.  
Chicago & Eastern Illinois.  
Cairo & Vincennes.  
Cheshire.  
Cincinnati, Wabash & Michigan.  
Chicago, Burlington & Quincy.  
Chicago & Northwestern.  
Cleveland, Columbus, Cincinnati & Indianapolis.  
Davenport & Northwestern.  
Delaware, Lackawanna & Western.  
Delaware & Hudson Canal Co.  
Detroit & Milwaukee.  
Dunkirk, Allegheny Valley & Pittsburgh.  
Eastern.  
Eel River.  
Evansville & Terre Haute.  
Flint & Pere Marquette.  
Fort Wayne, Jackson & Saginaw.  
Grand Rapids & Indiana.  
Hannibal & St. Joseph.  
Indianapolis & St. Louis.  
Kansas Pacific.  
Keokuk & Des Moines.  
Lafayette, Muncie & Bloomington.  
Lehigh Valley.  
Michigan Central.  
Missouri Pacific.  
Missouri, Kansas & Texas.  
New York & New England.  
New York, Lake Erie & Western.  
Oil City & Ridgway.  
Ogdensburg and Lake Champlain.  
Poughkeepsie, Hartford & Boston.  
Rome, Watertown & Ogdensburg.  
Saginaw Valley & St. Louis.  
St. Louis, Kansas City & Northern.  
St. Louis, Belleville & Southern Illinois.  
St. Louis, Alton & Terre Haute.  
St. Louis & Southeastern.  
St. Joseph & Denver City.  
Sheboygan & Fond Du Lac.  
Toledo, Peoria & Warsaw.  
Worcester & Nashua.

The additions to the list published Sept. 27 are the Boston, Barre & Gardner; Canada Southern; Chicago, Burlington & Quincy; Delaware & Hudson Canal Co.; Eastern; Grand Rapids & Indiana; Indianapolis & St. Louis; Keokuk & Des Moines; Lafayette, Muncie & Bloomington; Oil City & Ridgway; Ogdensburg & Lake Champlain; Poughkeepsie, Hartford & Boston; Rome, Watertown & Ogdensburg; St. Louis, Alton & Terre Haute; St. Louis, Belleville & Southern Illinois; St. Joseph & Denver City; and Sheboygan & Fond du Lac.

### Committee Circulars of the Master Mechanics' Association.

#### CIRCULAR ON LUBRICANTS.

The undersigned, appointed as a Committee on Lubricants at the last annual meeting of the Association, would respectfully call the attention of all the members to this subject, and ask their earnest cooperation in the investigation of the same. We desire, of course, to ascertain which are the best and most economical oils for the various purposes for which they are used about locomotives. Actual results are of much more value than opinions; therefore aside from experiments made by those possessing oil-testing machines, we would ask each member to state:

1st. The kind of oil used by you for general lubrication of the machinery.  
2d. The kind of oil or lubricant used for valve seats and cylinders.

3d. The kind of oil used for journal bearings.  
4th. State the miles run per pint of each, machinery, cylinder and journal-bearing oils.  
5th. State the cost per mile run for each, machinery, cylinder and journal-bearing oils.

By the above questions it is pre-supposed that each road has adopted some standard lubricants. If your road is using or has used a variety of oils, etc., please fill up the blank below.

Statement of lubricants used for locomotives on the \_\_\_\_\_ R. R. during the year ending Dec. 31, 1878.

#### MILES RUN BY ENGINES.\*

LUBRICANTS FOR CYLINDERS.—Kind—Amount of each kind—Cost of lubricant—Cost per mile run—Amount of lubricant for cylinders per 100 miles run.

LUBRICANTS FOR MACHINERY.—Kind—Amount of each kind—Cost of lubricant—Cost per mile run—Amount of lubricant for machinery per 100 miles run. Remarks.

#### Averages.

6th. If you have made any experiments with a view of ascertaining the comparative merits of different oils or lubricants for the various uses on locomotives (machinery, valves, etc.), please give result of same, with full particulars of the trial. Also describe in detail, so far as practicable, any experiments you have made bearing on the subject of lubrication.

7th. From the results above stated, or from other reasons (mentioning the same), please state what your preference is for lubricants for each of the various uses about a locomotive.

8th. Do you consider self-feeders a better method of oiling valves than the old way of placing the cups on steam-chests or inside of cab?

In conclusion your Committee hope that inasmuch as there has been, heretofore, cause for serious complaint about the lack of responses to circulars on this subject, there will be a full return this year. Let every member contribute something, and thus aid us in gaining additional knowledge on this most complicated of questions.

Signed,

WM. FULLER, Gen'l M. M., A. & G. W. R. R.  
F. M. WILDER, M. M., N. Y., L. E. & W. Ry.  
JOHN ORTTON, Mech'l Supt., C. S. R.

You will please send reply to Wm. Fuller, Gen'l M. M. of A. & G. W. R. R., Meadville, Pa., not later than March 15, 1879.

\* In this column state the number of miles run by the engine for each kind of lubricant separately.

### COMPARATIVE PERFORMANCE OF LOCOMOTIVES.

DEAR SIR: At the last annual convention of the American Railway Master Mechanics' Association, the undersigned were appointed a committee to report on the subject of "Comparative Performance of Locomotives."

In order to prepare a report on the subject, the Committee respectfully request members to furnish them with statements of performance of the several classes of locomotives, viz.:

AMERICAN, or four-wheel coupled engine.  
TEN-WHEEL, or six-wheel coupled engine.  
MOGUL, or six-wheel coupled engine, with pony truck.  
CONSOLIDATION, or eight-wheel coupled engine, with pony truck.

Please give dimensions of each class of engines.

Diameter and stroke of cylinder.

Weight of engine and tender.

Kind of fuel used.

Diameter of driving-wheel.

Consumption of fuel per mile.

Maximum grade of road.

Also please furnish number loaded cars hauled per mile with each class.

Average weight of car.

Total expenses per car per mile.

The Committee desires the members to furnish full and accurate statements of the performances of locomotives that they may present a report valuable for reference.

Very respectfully,

WILLIAM WOODCOCK, M. M., C. R. R. of N. J.  
S. A. HODGMAN, M. of M., R., W. & B. R. R.

Please address replies to William Woodcock, Master Mechanic Central R. R. of New Jersey, Elizabeth, N. J.

### THE SCRAP HEAP.

#### Railroad Manufactures.

The Chicago shops of the Chicago & Northwestern road have begun work on eight new locomotives.

The Michigan Car Co., at Detroit, has an additional order for coal cars for the Columbus & Toledo road.

John L. Gill, at Columbus, O., recently shipped some narrow-gauge cars to the Bellaire & Southwestern road.

The Chicago, Rock Island & Pacific shops at Chicago are building several mogul freight engines for use on the heavy grades of the Southwestern Division.

The Coburg (Ont.) Car Works are building some freight cars for the Canada Central.

The Indianapolis Rolling Mill Co. has contracted to furnish a lot of iron rails for the Chicago & Lake Huron road.

The Iron-Clad Paint Co., at Cleveland, O., has lately filled orders for the Cincinnati Southern, the Pennsylvania, the Boston & Albany, the Georgia, the Mobile & Ohio, the New York, Lake Erie & Western, the Wabash and other roads, the Edge Moor Iron Co., the Keystone Bridge Co. and the Michigan Car Co.

The Portland (Me) Rolling Mills are running on a contract for 2,000 tons of iron rails and large orders for bar iron.

The Old Colony Rivet Works, at Kingston, Mass., have been obliged to put in an engine and boiler to assist the water-power.

The Wason Manufacturing Co., at Brightwood, Mass., has contracted to build the passenger and baggage cars for the new Boston, Hoosac Tunnel & Western road. The company is also building three combination and six passenger cars for the Truxillo & Calaveras road in Peru.

E. S. Wheeler & Co., of New Haven, have renewed for a year their lease of the Birmingham (Conn.) Iron and Steel Works.

Park, Long & Co., owners of the Vulcan Forge and the Iron City Tools Works, at Pittsburgh, have recently filled a large order for tools to go to New Zealand.

Bissell & Co., of Pittsburgh, are now making railroad car stoves with the Winslow patent safety tank attachment.

The Allikanna Rolling Mill, at Wills Creek, O., has been leased to W. J. Hammond, of Pittsburgh, who will start it upon bar iron, as soon as necessary repairs can be made.

The Ward Iron Co., at Niles, O., is making 10 tons of plate iron per day.

The Danforth Locomotive Works, at Paterson, N. J., are shipping some locomotives for the Louisville & Nashville road.

The Rogers Locomotive Works, at Paterson, N. J., have a number of small orders on hand, and last week shipped an engine to the Danbury & Norwalk road.

The Iron Telegraph Pole Co. has been organized in San Francisco with a capital stock of \$100,000. The directors are W. H. Milliken, Frank B. Rae, P. L. Weaver, Stephen D. Field and J. H. Lyman.

An addition has been made to the Rome Merchant Iron Mill, at Rome, N. Y., and the works are now turning out 30 tons a day, with some large orders on hand.

Contracts have been made to ship 12,000 tons of zinc ore to Belgium from the Sterling Hill Mine at Ogdensburg and the Georges Mine at Franklin Furnace, N. J.

The Laclede Rolling Mill, at St. Louis, is running double turn in the forge and mill, turning out 70 tons a day of bar and plate iron.

John Stephenson & Co., the great street-car builders, and the Pennsylvania, the New York Central & Hudson River and several other railroad companies, and the Standard Oil Company, have been using the silicate enamel paints introduced into this country by Mr. Howard Fleming, for car-painting, with it, it is said, good results. For painting iron in almost all situations it is said to be especially suitable.

#### Bridge Notes.

The Vulcan Iron Works of H. A. Ramsay & Co., at Baltimore, have the contract for an iron highway bridge over Walters' Run, in Harford County, Md.

The Massillon (O.) Bridge Co. has contracts for four highway bridges in Trumbull County, O.

Kloman's Superior Mill at Pittsburgh is now rolling the steel beams for the Chicago & Alton's new bridge over the Missouri at Glasgow, Mo. The steel is furnished by Hussey, Howe & Co., of Pittsburgh. This bridge is to be entirely of steel and will have five spans of 350 feet each.

#### Notes.

When a prominent railroad agent receives a card with his name on it and the title of "Champion Liar of the Northwest," it is presumed that he does good linguistic work for his company.—*Chicago Inter-Ocean*.

Dialogue between a station agent and a locomotive engineer on a bankrupt road:

Agent.—Give us a few chunks of coal, Bill, I'm nearly frozen and there isn't a cinder around the place.

Engineer.—Well, I suppose you'll have to take it, but I got the last coal out of the yard, and how in thunder I'm going to get down to-morrow I don't know, unless I can pick up some old ties up the road.

That road is pretty thoroughly bankrupt.

#### Tramps.

The festive tramp wends his way southward as cold weather comes on, and last week 100 of him boarded a

freight train on the Chicago, St. Louis & New Orleans road at Como, Miss., beat the conductor and undertook to run the train to suit their own convenience. They were met at Fulton, Ky., by an armed force, and compelled to leave the train.

A few are left at the North yet, however, and last week four of them were arrested for amusing themselves by planting ties in a cattle guard on the Shore Line road in Connecticut. The result of this diversion was a wrecked freight engine.

On one day recently 62 tramps were turned off Central Pacific trains between Reno, Nev., and Truckee, and it was not a good day for tramps, either.

#### A Thirsty Corpse.

A terrible accident occurred in the yard of the Pennsylvania Railroad, near Twenty-fifth street, recently, a shifting engine striking an aged individual who was placidly meandering along the track, apparently under the impression that he had been given the right of way. The remains were tenderly gathered up and placed on a Valley passenger train, which was passing at the time, and conveyed to the Union Depot. A pitying crowd gathered round, but were much surprised to see the alleged corpse open his eyes and feebly murmur "Whisky." A five-finger dose of Monongahela had such a revivifying effect that the victim of the accident was able to grumble at the officials for taking him so far out of his way, and started back up town, this time choosing the pavement for his promenade. The next time he officiates as an amateur track inspector he will let a red handkerchief protrude from his pocket as a flag to protect his rear.—*Pittsburgh Telegraph*, Nov. 2.

#### Philadelphia Engineers' Club.

This society seems to be a very productive one. At its last meeting no less than four papers were read, one by Prof. Lewis M. Haupt (President of the Club), on "The Scales of Maps and Drawings," one by Mr. C. F. Conrad (read by Mr. I. W. Morris), concerning the "Butler Mine Cut-off," one by Mr. Edmund R. Andrews, proprietor of the Hayford Creosote Wood-Preserving Works, on the apparatus used in his process and the results obtained with the treated wood, and one by Percival Roberts, Jr., on "The Strength of Wrought Iron in Structures."

#### Prices of Rails.

There is unusual interest at this season in the prices of rails, as the large contracts which last spring filled the mills with work until this time or later will soon be executed, and there is a question whether the demand will be continued great enough to maintain prices. The following indications are given in the careful Philadelphia report of the *Iron Age*, written under date of Oct. 29:

"Steel Rails.—The market is a little feverish, although there are many inquiries and a disposition to purchase largely when prices are shaded to meet buyers' views. Sellers are quite willing to accept business at prices current during the past month or two, but orders are not easily secured unless some concessions are allowed. Manufacturers are firm, however, and seem prepared to hold prices steady. No large lots have been placed during the week, and so far as we can learn all sales have been at prices upward of \$42, at mills, although \$43 is claimed to have been bottom figure. In view of the large amount of business likely to be given out during the next two months, it is not unlikely that very desirable buyers may obtain concessions. Indeed, it is reported that some have already obtained special favors, which others will doubtless claim before placing their orders. Should any general decline in prices occur it will be due to close competition rather than to any actual scarcity of business. Sales during the week have been chiefly small lots at prices ranging from \$43 to \$45, according to section of rail, location of mill, etc. Buyers' views for large lots seem to be about \$2 below these figures.

"Iron Rails.—The firmness noted in our late reports is well maintained, and all sales so far as known have been at the full quotations of last week. There are additional inquiries, and prospects for winter work are quite encouraging. The majority of the mills are full of orders, and as an evidence of the confidence felt we may mention the fact that one mill voluntarily canceled a 500-ton cash order at rates current a month ago. Sales reported during the past day or two in part are as follows: 1,000 tons 56's, \$33 at mill; 100 tons 56's, \$34.50 at tide; a lot of 60-lb. center-bearing streets, \$36 at mill; 47-lb. side-bearing trams, \$35 at mill, and other small lots at prices in proportion. We quote \$32@35 for average qualities, according to location of mill, section of rail, terms of payment, etc.

"Old Rails.—The market has weakened considerably during the past few days, and buyers are now comparatively scarce. The recent demand was almost entirely for account of Pittsburgh parties, and as there are said to be prospects of considerable shipments from the Southwest, they are no longer buyers in the Eastern markets at prices current ten days ago. Still, it cannot be said that there are any lots pressing for immediate sale, but the chances are that bids for large lots will be at lower figures than could have been obtained some time ago, if indeed, such bids can be had at all. There is no doubt a great scarcity of old rails at interior points and also at accessible points on the seaboard, but, as stated in our last report, there are large lots held in some of the New England States, as well as in the South and Southwest. The removal of the yellow-fever embargo and high water in the Western rivers, it is expected, will bring out large supplies, and cut off the demand in the Eastern markets unless prices are brought down to something near the old level. In the meantime, prices are entirely nominal. Philadelphia delivery, \$19@20, according to quality."

The *Engineering and Mining Journal* of Nov. 2 says:

"We hear of a sale of 5,000 tons of steel rails at \$42 at mill. There is still a good inquiry, with indications of a very active demand next year. We quote steel rails at \$42 to \$44 at mills. Iron rails are attracting but little attention. We quote at \$32 to \$36 at mill." It reports "a very good inquiry for old rails, a sale of 2,000 tons on private terms, and quotes at \$19 to \$20."

#### Commissions to Engineers.

The Institution of Civil Engineers has given formal expression to the feeling which actuates the whole body of the profession. A letter has been addressed by Mr. James Forrest, Secretary of the Institution of Civil Engineers, to the Secretary of the Clyde Navigation Trustees, which speaks for itself. It runs as follows:

"The Council of the Institution of Civil Engineers have been informed that a statement has been made to the Clyde Trustees that civil engineers are in the habit of receiving double commissions—that is to say, from their employers and from the contractors engaged to do the work. I am requested by the Council to give the most unqualified contradiction to this statement, and to add that, in the opinion of the Council, such a practice would be distinctly dishonest, and would constitute a disqualification for membership of this Institution."

Such an expression of opinion was wanted, and we venture to hope that it will settle forever a question which has been discussed by the very few and dismissed without hesitation by the very many members of a profession which has hitherto maintained the highest possible reputation for honesty.—*The Engineer*.





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## EDITORIAL ANNOUNCEMENTS.

**Passes.**—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

**Addresses.**—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

## THE INFLUENCE OF THE GAUGE OF TRACK ON CURVE RESISTANCES.

Another interesting letter from our narrow-gauge correspondent is published in this number of the *Railroad Gazette*. It seems probable, though, that the interest of the controversy is about to be lost by mutual agreement, which, of course, is the happiest end of all controversy. Before that desirable end is attained, however, a few things still remain to be made clear.

We regret, however, that Mr. Ramsey has seen proper to quote two sentences from our last article omitting the intervening clause, so that they have an entirely different meaning as quoted from that which they had in the original. The quotation is the following: "If a single pair of cylindrical wheels is rolled on a curve, if the axle is kept radial to it, the only resistance due to the curve is the longitudinal slipping of one of the wheels." (Here the clause describing two wheels placed in line with each other with their axes held parallel to each other is omitted and the following sentence is quoted.) "On a single rail there would be no diagonal slipping because the longitudinal component does not exist." The longitudinal component does not exist when two wheels with parallel axes run on a single curved rail, and there is then no diagonal but only lateral slip. When a single pair of wheels runs on two curved rails, the axle being radial, the lateral component does not exist and then there is then no diagonal slip, but only longitudinal slip.

We agree, however, most heartily to the following conclusions of Mr. Ramsey, but we amplify them by the statements in brackets:

"1st. That a pair of wheels on a single axle, on two rails, has neither lateral slip nor flange friction, and consequently no resistance due to these causes." [One of the wheels, if they are cylindrical, must, however, slip longitudinally, and consequently there is resistance due to that cause.]

"2d. That a pair of wheels on two axles, on a single rail, has no longitudinal slip, and consequently no resistance due to this cause." [They have, though, lateral slip and consequent flange friction with the attending resistance.]

"3d. If it requires one axle, two wheels and two rails to produce longitudinal slip, and two wheels, two axles and a single rail to produce lateral slip and flange friction, one wheel on one rail will have neither of these causes of resistance, and, therefore, no resistance due to them." Mr. Ramsey seems to think that we ought to be overwhelmed by this conclusive syllogism. We are not, but admit it all and regard it as a beautiful deduction from what we have written, and are quite content with his admission that "there is resistance on a single rail when two wheels are fixed on axles parallel with each other." His assertion that "on the single-rail road the wheels are so arranged that they are independent of each other, and always accommodate their axles to the radii of the curve" needs some proof. We have observed a number of plans of single-rail roads but never saw one with the arrangement he speaks of. The single-rail car exhibited on the road at the Centennial had no such arrangement, but as he speaks so confidently, he can doubtless furnish a drawing or refer to some road on which this is used, which, it must be confessed, we have never seen nor heard of.

There is, though, one exception to the statement that there is no curve resistance with a single wheel on a single rail, which is, perhaps, worth mentioning, but of which we will take no further account. If the single wheel is cylindrical, a slight twisting force must be exerted to make it roll in a curve, and some resistance is due to this cause, but if the wheel is conical, it will roll as easily in a curved path as a cylindrical wheel will in a straight line.

We also submit, in the interest of truth, to be catechized by our correspondent, and to his first question: "Is not the resistance due to longitudinal slip proportional to the gauge?" We say, unhesitatingly, on curves of the same radii, yes.

To the second question: "Is not the resistance due to lateral slip and flange friction due to the wheel-base, and proportional to the wheel base?" we also say yes; but the proportion is not an arithmetical one, but is probably that of the versed sine of the arc subtended by the wheel-base.

As one good turn deserves another, we will ask Mr. Ramsey whether the lateral slip and flange friction of a pair of wheels on two parallel axles, a given distance apart, are not independent of the gauge, and, therefore, the same on a single rail or a narrow-gauge as if the rails were 4 ft. 8½ in. apart. If this is so, then we have the different elements of train resistance as follows, all things but the gauge being alike:

The effect of gravity	.....	the same on both gauges.
Resistance of atmosphere	.....	" " "
Rolling friction	.....	" " "
Flange friction	.....	" " "
Lateral slip	.....	" " "
Longitudinal slip	.....	proportional to gauge.

If this statement is correct, then it will be seen, as we have urged from the beginning, that the only cause for a difference in resistance on a wide and a narrow gauge is that due to the longitudinal slip, the effect of which was carefully calculated in the table given in the *Railroad Gazette* of Oct. 11. Whatever this difference is, it is an advantage which the narrow gauge possesses over the standard gauge. If, however, larger wheels can be used on the standard gauge than are safe on the narrow gauge, that is an advantage which the former has over the latter.

Our correspondent asks whether we "mean to assert that a piece of iron whose supports are 6.25 ft. apart will support the same load that it would with the supports 4 ft. apart," to which we answer yes, if the load is carried on the overhanging ends of the bar, as it is on an axle. Two bars of iron each supported on two points—as an axle is—may be of the same size and support the same load, provided in each case that they project an equal distance from the supports. An axle at the wheel-seat and between the wheels must be stronger to resist the lateral strains against the flanges of big wheels than it need be if the wheels are smaller, but to carry the same loads the journals may be of the same size in each case and still have equal strength.

Mr. Ramsey grows facetious about putting a 14-inch bolster between two 33-inch wheels with a 37-inch wheel-base. It is true you can't get such a bolster into such a place, but no more do we see how he can get a 14-inch bolster between two 24-inch wheels spread 37 inches apart. But then that is not of vital importance, because if the bolster will not go in between the wheels it must be placed somewhere else. It seems, though, as if Mr. Ramsey seriously intended to assume the position that a short wheel-base can be used on a narrow gauge and cannot be used on a standard gauge,

and he speaks sneeringly of going back to our grandfathers' days, fearing, evidently, that their practice may be quoted against his assumptions. The fact that our grandfathers used a good thing is certainly not a reason against, but very much in favor of, its use now, unless there is something better to take its place. If any one seriously doubts whether as short a wheel-base can be used on a standard gauge as is now in use on a 3-ft. gauge, we will furnish engravings of trucks with the required dimensions. As a matter of fact, we do not believe that the length of wheel-base, within moderate limits, say four or five feet, is of much practical importance, even on curves as short as those used on the Bell's Gap Railroad, which are, we believe, of 250 feet radius; but in order to meet the arguments which have been advanced it has been thought best to show that if there is any advantage to be gained from shorter wheel-bases they can be used as well on a standard as on a narrow gauge.

We will add that we can give Mr. Ramsey or any other person the names of a number of reputable and responsible car manufacturers who will build what he is pleased to call "mythical" car-trucks just as soon as he, or any one else, has any cash orders they want filled. The names may be revealed sooner, perhaps, when we come to consider the question of the difference in cost of "mythical" and actual rolling stock.

The experiments which Mr. Ramsey is making on curve resistances will, no doubt, be very interesting when he has completed them. He will then, it is hoped, make not only the results public, but give a description of the appliances and the methods employed in making them.

It must not be lost sight of, though, that the real question under discussion is whether narrow-gauge railroads "can be built for from one-half to two-thirds the cost of a broad gauge, and can be operated at two-thirds the cost." This is the proposition which our correspondent laid down and has undertaken to uphold, and which, if true, is one of the most important discoveries of modern times, and if not is one of the greatest delusions. What answer, though, should be given to a person who has made such sweeping assertions, and then asks: "What advantage would a broad-gauge road, equipped with your narrow-broad-gauge trucks and cars, have over a regular narrow-gauge road?" The question at issue is not whether light broad-gauge roads are better than light narrow-gauge roads, but whether the latter are much cheaper than the former, and therefore we decline to take up the new issue contained in our opponent's last question. Does he not see that if he fails to prove his first proposition he has been talking professional nonsense, and that if he is mistaken in his statement that narrow-gauge roads cost "from one-half to two-thirds" what they would if the rails were put 4 ft. 8½ in. apart, then he is wrong in a matter about which it is of vital importance that he, as an engineer, should be right? On the other hand, if looked at from a public point of view, if the narrow-gauge advocates are right and we are wrong, then we are misleading our readers in a matter of very great importance to the whole community. Our correspondent must either stand or fall by his original proposition, and the practical question at issue is how much more would the Bell's Gap Railroad have cost to build and operate if it had been made of 4 ft. 8½ in. gauge, so as to give the same facilities to traffic in each case. To answer this we need a statement in detail of the total cost of the present line, which it is hoped Mr. Ramsey will furnish.

## THE CENTRAL PACIFIC.

The Central Pacific Railroad Company has two very different kinds of road and traffic. First, it has one end of the sole line between the Atlantic and the Pacific, over which the whole Pacific railroad traffic necessarily passes—a tolerably simple, not at all heavy traffic, easily conducted by a very few trains, on which rates are easily maintained for passengers and valuable freights, the competition of the steamers by way of Panama and the sailing vessels around Cape Horn—an enormously long voyage—affecting chiefly the coarser and heavier freights. This line is very like the Union Pacific, but probably has a somewhat heavier local traffic.

But this through line of the Central Pacific from San Francisco to Ogden is less than half of the road worked by it—but 863 out of 2,075 miles at the close of 1877. This company does not own all this road, it is true, but it works it all, and we may say that the care of the Pacific through traffic is the smallest part of its work, its great task being the conduct of a great and complex system of railroads which serves the great state of California, and includes by far the greater part of the mileage of that state.



The main line takes care of itself very well, with a simple traffic and heavy earnings. But the other lines are not so easily sustained, many of them having a very thin traffic, and part of the longest being at present perhaps as unproductive a piece of railroad property as there is in the world.

The existence of this purely local system is apt to be ignored, and judgments are passed on the Central Pacific as if it were, like the Union Pacific, all main line, with a steady traffic more perfectly under the control of the company than almost any other in the country. The Central Pacific's local lines do not suffer much from the competition of other railroads, it is true, for there are scarcely any others in the field which they occupy; but their traffic fluctuates with the production of the country, which on some of the lines varies more than in almost any other part of this country. This is well illustrated by the report for the past two years. In 1876 the local freight forwarded from agricultural districts amounted to 165,507 tons, in 1877 only to 80,231 tons. The difference was due chiefly to the failure of the wheat crop in 1877. The difference is still more striking when we compare the business in the last half of the year, when the wheat is chiefly marketed, for there was a light crop in 1875 as well as 1877. Now, in the last half of 1876, 142,321 tons of freight were forwarded by the lines worked by this company from agricultural districts; in 1877, with a larger mileage, only 42,726 tons—not one-third as much. The difference between a big crop and a little crop in Minnesota is nothing to this. From the whole year's freight from these districts the receipts were not quite half as great in 1877 as in 1876.

Not only has this company very different kinds of road, but it has a rapidly growing system. At the end of 1875, it was working 1,308 miles of road; this had grown to 1,660 at the end of 1876, and to 2,075 miles at the end of 1877. In the latter year, however, the growth was caused only partly by new construction. About 190 miles which had always been worked by the General Superintendent of the Central Pacific, but as independent roads, were before the end of 1877 worked as parts of the Central Pacific, and their earnings and expenses are now included with its. One effect which we have heretofore noticed has been a great reduction in the average earnings per mile; the old road had (and doubtless has) large earnings; the new ones mostly very light receipts. There is one branch 30 miles long which earned but \$600 per mile gross in the year ending with June, 1877; another 18½ miles long that earned less than \$2,350 per mile in the same year; the Southern Pacific that year reported about \$5,400 earned per mile; another line of 19 miles now worked by the Central Pacific earned a little less than \$2,000 a mile then. In 1875 the gross earnings of the whole system worked were \$12,069 (from an average of about 1,300 miles worked); in 1877 they were \$9,238 (from an average of 1,783 miles worked).

Before 1875, this company showed constantly and quite rapidly increasing earnings without much change in mileage. Since that year the increase in receipts and profits has not been at all in proportion to the increase in mileage, as will be seen by the following statement of mileage, gross and net earnings and net earnings per mile since 1870:

Year.	Average miles worked.	Gross.	Net.	Earnings per mile.
1871.....	997	\$8,862,054	\$5,021,252	\$8,889
1872.....	1,156	11,963,641	6,952,362	10,349
1873.....	1,222	12,863,953	7,894,681	10,527
1874.....	1,315	13,611,031	8,342,899	11,193
1875.....	1,298	15,065,082	9,177,882	12,069
1876.....	1,425	16,994,216	9,137,005	11,928
1877.....	1,783	16,471,144	8,686,726	9,238

The addition of nearly 50 per cent. to the mileage since 1874, it appears, has added but about 4 per cent. to the profits, which were never so large as in 1875, when 485 miles less were worked than in 1877. And for the first half of 1878 when 2,075 miles were worked, a very slight advance is shown over the corresponding period in 1877, when about 1,700 miles were worked. That is, with the addition of about 375 miles of road, there has been an increase of \$373,000 in gross and of \$689,000 in net earnings for the half-year.

It would be, however, a great mistake to conclude that there has been any real retrogression of the old property since the acquisition of the new, or that the trifling increase of earnings is any indication of the amount which the new lines have added, not to say will add, to the receipts of the company. For, as we have before said, 1877 suffered greatly by the bad wheat harvest; and doubtless the earnings of the old lines showed a great decrease then, which was nearly but not wholly made up by receipts from the new mileage.

Another reason why so little increase is shown by the large increase of new mileage is the incomplete

character of the largest part of the new road—the Southern Pacific. This is not extended far enough yet to command completely even the Arizona traffic, and it cannot be expected to have anything more than an extremely thin traffic over the southeastern 200 miles while its terminus remains at the Colorado River.

The great change caused by a good wheat harvest is visible since June in the increased earnings reported by the company. For the three months ending with September the earnings have exceeded those for 1877 by a fifth, and have just about equaled those of 1876, which were the largest in the company's history.

The company's reduced earnings in 1877, however, were not wholly due to reduced local traffic. The through traffic fell off also, the freight from 188,774 tons to 173,239, or 8 per cent., and the passengers from 98,420 to 78,682, or 20 per cent. The falling off in through passenger traffic alone must have reduced the earnings some \$500,000, and such a reduction is the more regrettable because the decrease in traffic does not cause any appreciable reduction in expenses. The through traffic on this road in 1877 amounted to 126 passengers each way daily (week days), which must have required substantially the same train service as the 157 carried in 1876, or the 168 carried in 1875. The through passenger traffic, it is interesting to note, was the smallest for four years. Unlike that of most other railroads, it is very unequal in the two directions, and always has been. In 1877, 60 per cent., in 1876, 61½ per cent., in 1875, 71 per cent., and in 1874, 69 per cent. of its through passengers were carried west. Since 1871, 316,838 passengers have gone through over this road to the west, and but 169,437 have come east, indicating that California has received about 147,000 immigrants by the road in the six years, or an average of 24,500 per year. The movement culminated in 1875, when 44,500 more went to than came from California: in 1877 the difference was but 16,200.

The through freight traffic of this road has a peculiar interest. Before the Pacific railroads were built we heard a great deal about the vast Oriental traffic that was to be drawn across America by the completion of the great transcontinental line. Certainly the construction of the roads was long ago justified, and the traffic is important, including the "Oriental" traffic; but it is only by Oriental hyperbole that the latter can be called "vast." Very full statements of the weights of the different articles of through freight are given in the report, and the aggregate of those which are brought to the Central Pacific by sea, aside from Oregon produce, seems to be 13,380 tons in 1877, or say five moderate steamer loads; and not all of this is "Oriental" traffic. Tea makes 9,202 tons of this, and coffee 1,901 tons. Possibly, however, some of the wool which forms the largest single item of through east-bound freight over this road arrives from Australia. But the entire through traffic over the road is only at the rate of about 24 full (10-ton) car-loads each way daily, which indeed is a very good business when such rates as the Central Pacific's can be had, but is not enough to prevent some less fortunately situated roads from starving to death.

The progress of the two main items of east-bound freight and of the total through traffic in both directions may be seen by the following statement for six years, quantities being tons:

	Wool.	Tea.	Total through.
1872.....	10,735	6,053	98,057
1873.....	14,505	6,363	110,188
1874.....	16,020	5,889	152,443
1875.....	20,514	9,186	173,794
1876.....	24,305	9,643	188,774
1877.....	22,442	9,202	173,239

The tea carried over this road amounts to something like one-third of the total imports of the United States.

There is a good deal of through freight carried over this road at very moderate rates. The distance from the Atlantic to the Pacific is so vast that even at a cent per ton per mile the cost of goods is increased 1½ cents per pound by the carriage. This effectually prevents the carriage of some freights by this route. Wheat, for instance, the exports of which from California this crop year will probably amount to four times as much as the whole through traffic of the Central Pacific, never goes to the East by rail, but seeks the cheapest route to the Pacific and then takes the long but cheap voyage around Cape Horn. But there are many other freights which will go by rail if taken at a trifling advance over cost, but, not otherwise; and provision is made for such cases in the classification. On the average, however, the road obtains good rates, which almost everywhere east of the Mississippi would be called very good rates, namely, in 1877, an average of 3.02 cents per mile for passengers, and 3.14 cents per ton of freight.

The road is very cheaply worked, considering the thinness of the traffic on a large part of the mileage. Economy is favored by the character of the through passenger traffic, and in 1877 even the average passenger-train load was 93, which is at least one-half greater than the average of roads in this country. The average freight-train load, however, was only 90 tons, which is decidedly light. Its working expenses were 47.2 per cent. of its receipts (erroneously printed 52.8 in the report), and if alike for passengers and freight then the average cost was 1.484 cents per ton per mile, and 1.425 cents per passenger per mile, leaving the very handsome profit of 1.660 cents per ton per mile and 1.595 cents per passenger per mile. It must be remembered that the property is not to be compared with Eastern trunk or secondary lines, but rather with border railroads. Last year, taking it altogether, its traffic amounted to but 240 tons of freight and 140 passengers each way daily over the entire average mileage worked, all of which could be easily carried by one train of each kind. For a road of this kind, it is cheaply worked.

The future of this property seems to be to an unusual degree in the control of its managers, who are understood to be almost its sole owners. They pretty nearly control the railroad system of California; at least there are very few lines in that state which come in competition with theirs. What was most to be apprehended was a diversion of a material part of the through traffic by the completion of another Pacific railroad. But it now seems probable that the first road to be completed will be the Southern Pacific, which the Central Pacific people are building themselves. This common ownership will probably not prevent a diversion of traffic from the Central Pacific, and very likely to as great an extent as if it were owned by other interests; but it will doubtless very effectively prevent the ruin of the value of the through business, which very likely would result if the new road should be an independent competitor.

#### Past and Probable Future Progress of Cotton Production.

Cotton continues to be our largest single item of export (in value), but it does not form nearly so large a proportion of the total exports of the country as it used to, and, indeed, the exports of cotton recently, when the production has been much above the average before or since the war, have not been so great in quantity as they have been some years, and more especially in 1860, because more cotton is now manufactured in this country. The New York Times has recently published statements of value of cotton exports and of total exports from the United States to Great Britain by years and by decades since 1820, by which it appears that the cotton exports were the following percentages of the total exports in the several decades:

Decade.	Per cent.	Decade.	Per cent.
1821-1830.....	70	1851-1860.....	70
1831-1840.....	82	1861-1870.....	46
1841-1850.....	60	1871-1878.....	42

The great decrease from 1851-60 to 1861-70 is partly accounted for by the war; but it will surprise many to learn that there was, after all, but a small decrease in the aggregate value of the cotton exports (less than 5 per cent.), the great advance in price during and for several years after the war making up for the decrease in quantity. More effective in reducing the proportion of cotton to the total exports was the enormous increase in other exports—chiefly in grain, provisions and petroleum.

This will be seen by a comparison of the average annual values, in millions of dollars, of cotton and of all other exports to Great Britain, in each decade, which have been as follows:

Decade.	Cotton.	Other.	Total Exports.	P. c. of Cotton.
1821-1830.....	18.5	5.7	24.2	76
1831-1840.....	37.8	8.4	46.2	82
1841-1850.....	37.9	19.2	57.1	66
1851-1860.....	84.0	35.3	119.3	70
1861-1870.....	80.0	94.8	174.8	46
1871-1878.....	138.4	185.1	323.5	42

One might almost say that the other exports of the country were insignificant until after 1860, since which time their growth has been more rapid than that of cotton ever was. In the current decade the average yearly cotton exports have been seven and a half times as great as in the decade after 1820, but the other exports have been 32½ times as great. But the present position of cotton is made to appear more favorable by these figures than it actually is. While there is a large increase in the average annual exports as compared with the decade from 1860 to 1870, the latter was entirely abnormal, the exports for half of it having been interrupted by the war to such an extent that out of 800 millions exported in the decade, 757 millions were in the last half of it; and, comparing with this last half, the average annual value of the cotton exports to Great Britain have decreased from \$151,000,000 in 1865-70 to \$138,000,000 from 1871-78—wholly due to a reduction in prices. But the great increase in the value of other exports has been in spite of a reduction in prices—an increase that has been especially marked since the panic of 1873 and the general fall of prices, during which period the value of cotton exports has decreased continually from year



to year. Compare the values in millions of dollars for 1873 and 1878:

	1873.	P. c. of total.	1878.	P. c. of total.	Inc. or Dec.	P. c.
Cotton.....	\$163.2	51.5	\$117.4	30.3	D. \$45.8	30.0
Other.....	153.6	48.5	270.0	69.7	I. 116.4	43.1
Total.....	\$316.8	100.0	\$387.4	100.0	I. \$70.6	18.2

The recent decrease in values of cotton exports, we repeat, must not be looked upon as a decline in the cotton industry, for it is caused partly by an increase in the proportion of the crop manufactured in America, and largely by a reduction in prices, there having been some increase in the average yearly production. But the statistics indicate that cotton is no longer to make the rapid progress established in some previous decades, and this conclusion is justified not only by the statistics, but by our knowledge of the extent and condition of the cotton-growing territory. There are no longer great unoccupied territories where cotton-growing is likely to be the chief industry. Texas was the last cotton state to be occupied, and the western part of that state is not a cotton country—at least, is not now utilized for cotton-growing to any extent, being preëminently a grazing country and having great advantages for that purpose; and Texas is the last of the cotton states. There is, doubtless, an enormous area of land in the other cotton states which has never been cultivated, and which may be planted to cotton, and probably will be if the industry becomes more profitable than heretofore. But experience teaches us that the progress made in production in the districts which have been long occupied and accessible is quite moderate, and that very rapid progress in increasing production is usually made only in connection with a heavy immigration to new countries, which, in the cotton belt, we are beginning to see the end of. There is a vast deal of room yet, doubtless, but nothing like that open to the planter emigrant before the war. Very few new railroads will be needed for cotton-carrying anywhere east of the Mississippi, and the railroads already there will not be likely to have a rapid increase in their local cotton traffic, and their total cotton traffic, if increased at all, will probably be by diverting the business from the rivers and the sea. Cotton-growing and cotton-carrying will remain great industries, but apparently will grow less rapidly than heretofore, and, doubtless, much less rapidly than the other productive industries of the country, which have now more room left for development.

There is one advantage which the cotton-growers of this country have, however, over the grain and stock-growers. Apparently there is nowhere else accessible to the world a good cotton country. Should we reach the limits of our land capable of producing wheat cheaply, before paying the higher price required for better cultivation of the old lands or the occupation of less productive new soil here, the world would probably resort to the vast and but partly used plains of Russia, to Australia and New Zealand; for there is an immense area capable of producing wheat as well as our soil which has hardly yet been touched. But it seems that nowhere but in our Southern States can cotton of good quality be so cheaply produced. This question was pretty well tested during our war, when prices rose to such a pitch that every place that could raise cotton at all was tempted to experiment with the crop. But no country has remained a serious rival of this for the supply of Europe, which is sufficient evidence that no other country can meet American competition. Now, should the world's demands increase, as in course of time they doubtless will, though they seem rather more than satisfied just now, when our new cotton lands are pretty much all occupied there must be such a rise in prices as will cause better cultivation and a resort to lands now not thought worth cultivation. When this day comes, there will probably be an increase in cotton production which will affect the old states as much as the new ones, and may cause the South to resort to high cultivation sooner than the North does, the consequence of which will be a comparatively dense agricultural population, where now it is very thin, and of course a greatly improved condition of the carriers, should not too many new roads be built. This prospect is some distance in the future, it is true, but not so far as the prospect of high culture of grain and grass crops, for the reasons that are here given. Europe's supply of cotton must come from the United States; for its bread and meat it can lay the world under contribution.

#### Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

*Utica, Ithaca & Elmira*.—Extended from Shedd's Corners, N. Y., northward to Cazenovia, 10 miles.

*Springville & Sardinia*.—Extended from Sardinia Village, N. Y., westward to Springville, 8½ miles, completing the road. It is of 3-ft. gauge.

*Shenandoah Valley*.—Extended to the Clark County, Va., line, 7 miles.

*Pine Hill*.—The first track is laid from Pine Hill, Ky., west 3 miles. It is of 3-ft. gauge.

*Delphos, Bluffton & Frankfort*.—The first track is laid from Bluffton, Ind., west by south to Warren, 14 miles. It is of 3-ft. gauge.

*Chicago & Alton*.—On the *Kansas City Extension* the track is extended from Glasgow, Mo., west to Marshall, 20 miles.

*Omaha & Republican Valley*.—Extended from David City, Neb., west to County Line, 14 miles.

*Central Pacific*.—This company's *Northern Railroad* is extended from Funk's Slough, Cal., north to Willows, 10 miles.

*South Pacific Coast*.—Extended from Alma, Cal., southward 2½ miles. It is of 3-ft. gauge.

This is a total of 89 miles of new railroad, making 1,724

miles completed in the United States in 1878, against 1,824 miles reported for the corresponding period in 1877, 1,913 in 1876, 1,080 in 1875, 1,524 in 1874, 3,130 in 1873 and 6,106 in 1872.

THE GREAT WESTERN OF CANADA REPORT has been presented for the half-year ending with July of this year. The gross receipts were 1.8 per cent. greater than for the corresponding half-year of 1877, the working expenses 4.1 per cent. greater, and the net earnings 4.7 per cent. less. There was, however, such a reduction of the losses in working leased lines, interest, etc., as to change the deficiency of \$15,553 in 1877 to a surplus of \$3,635 in 1878. There was a considerable increase in the earnings from through traffic, but a decrease in local traffic. The report says that "the average rates for through freight traffic compare very unfavorably with those of the corresponding period of 1877; for although the tonnage of through freight and live stock carried on the main line and branches has increased by 169,000 tons, or 39 per cent., the gross earnings from this traffic show only an increase of \$8,977, or 6 per cent." From this it would appear that 42 per cent. of the total earnings of this road were from through freight and live stock—a larger proportion than on any other considerable road in America; probably, except the Canada Southern. The working expenses per train mile for the half-year are the smallest ever reported—76 cents, against 79 cents the previous half-year, and 85½ the corresponding half of 1877. Only three years before these expenses were \$1.08. But the earnings per train mile are also the smallest ever known, being \$1, against \$1.25 for the half-year ending with January, 1878 (when through rates were the best for a long time), and \$1.15 in the first half of 1877.

Of all railroads in America none probably suffers more from low through rates than this. And, considering that the through freight traffic of the first half of 1877 was generally unprofitable, the statement that 39 per cent. more traffic this year produced only 6 per cent. more earnings indicates how great and how general the "cuts" must have been in east-bound freight. To produce this result the average rates must have been 24 per cent. lower. The west-bound rates we know were much higher in 1878 than in 1877, and were well maintained, and thus the reduction in east-bound rates must have been more even than 24 per cent. The average rate per ton per mile on through freight eastward over the Great Western then must have been a sort of monstrosity in the way of rates. A singular monstrosity, we were about to say; but as there are at least a dozen other roads which made the same rates, it cannot have been so singular as it was astounding. It ought to be published as a frightful example, and a warning to all lines negotiating for division of traffic, etc., of dangers which threaten them. Things seemed not nearly so bad the year that the Michigan Central reported an average rate of half a cent. a ton a mile on through freight east.

The first half is always the light half for the Great Western. Since July its weekly reports show largely increased earnings, though not more than for the corresponding period last year, when they were exceptionally large.

A GEODETIC STATE SURVEY OF PENNSYLVANIA is prayed for by the Engineers' Club of Philadelphia in a memorial to the Pennsylvania Legislature, which it has recently published and distributed. The importance of such a survey is well set forth in the memorial, but we think that it hardly gives sufficient prominence to the great expense that has been incurred for preliminary surveys of railroads and canals because of the lack of such a survey. In fact, for a very large part of the state of Pennsylvania much of the work of a detailed survey has been done, and sometimes over and over again, and then lost, in making surveys for railroads, many of which never were built, while for those that were, usually all the surveys made, except that of the final line, are entirely unavailable to the public. There are many parts of the country where the engineer surveying the route for a new railroad finds numerous lines of stakes set by previous surveyors, indicating that he is only doing work which they have done before him, but of which no record is known to exist. And railroad surveying is only one of many kinds which have to be done over and over again for want of an accurate and authoritative general map of the surface, such as the Coast Survey has provided of the sea coast and the Engineer Corps of the Great Lakes. That accomplished topographer, Prof. J. Peter Lesley, at present State Geologist of Pennsylvania, and for some years engaged in conducting the elaborate geological survey of that state, breaks out into loud lamentations over the utterly inadequate delineations of the topography of the state on which he has to fit his geological charts. "They neither fit on to each other nor correspond to any common standard map," he says. County lines, he says, are sometimes half a mile away from their true places. The joint commission of the states of New York and Pennsylvania to establish the line between those states, has found the old accepted line wrong at every point so far as it has surveyed.

The Coast Survey is now authorized to extend its system of triangulation over any state which provides for a scientific survey, and there never was a time when it was easier to get large corps of expert surveyors. The work which these men are aching to do, and will do at the lowest possible price, is one which will be valuable forever afterward—will be a permanent addition to the wealth of the country. In times when governments as well as corporations and individuals find it necessary to economize, it is very difficult to get attention for any project which requires ever so moderate an expenditure in a new direction; but this is a work that certainly will be undertaken some time, for lack of

which large expenses are being incurred yearly by citizens, and which is likely to cost more hereafter than if undertaken now.

CHEAP RAILROADS are making their appearance in many parts of the Northwest in their natural relations as branches of the existing extensive railroad systems, which can utilize for them materials and rolling stock which otherwise it might not be possible to employ economically. We hear of several such roads, of standard gauge and made to be worked with the heavy rolling stock of the main lines, which have cost the companies but four, six, eight and up to sixteen thousand dollars per mile, though in some of these cases part of the work has been provided by the communities interested and given to the companies on condition that they complete and work the road. But the capital on which interest must be paid is in these cases comparatively a trifle, and in strong contrast to the debts incurred in 1873 and before, when the new line which did not have a debt of \$20,000 per mile or more was thought to be a wonder. But as there are infinite degrees in the density of traffic which different districts may afford, so there must be many routes where a road costing \$10,000 per mile could be supported, but not one costing \$20,000, and so on. And if only moderate speed is required (and eight or ten miles an hour is certainly a great improvement on the three to five miles of our country roads), a railroad may be built and worked very cheaply. They might be and probably would be made much lighter than they actually are, but for the great advantage of using the old material and rolling stock of their connections. But frequently a branch can be built—a perfectly efficient railroad for all that is required of it—without purchasing any rolling stock or rails, and the availability of the old materials frequently determines, and rightfully determines, the character of the road.

Although traffic is now generally light and increasing but slowly, this is still probably for many companies a favorable time to secure territory now tributary to them by constructing branches. It is not likely that there will soon be a time when railroads can be made for less cost, and by a judicious occupation of sundry bits and corners of territory a company may often keep out of the field a parallel line that might largely destroy the value of the traffic of its whole road.

THE AUSTRIAN RAILROAD CLUB, which was established little more than a year ago, had on the 8th of October no less than 589 members, of whom nearly 500 were residents of Vienna or its immediate vicinity, which is an indication that the Austrian roads are much more heavily manned than ours, for though the members are not all what would here be called railroad "officers," officers appear to form the majority of the club, the others being of the higher ranks of employés. We notice among recent additions nine army officers belonging to the railroad bureau of the general staff, chief engineers, inspectors, chief clerks, directors, store-keepers, station-masters, assistant engineers, and great numbers of "Beamten," which may be translated officer or employé: a conductor is a "Beamte"; but among these club members who are "Beamten" are several "Doctors" and some "Chevaliers." The club seems to be a wonderfully active and efficient organization, having weekly lectures, and publishing them in a weekly paper established as its organ, which has a very handsome appearance. At the first two meetings held this Fall the addresses were "On the Past and Future of Universal Exhibitions," by the Engineer Mannlicher, and "The Nature and Use of Short-Hand," by a Professor Engelhard, who gives instruction in stenography to club members. The club has a spacious reading-room, with more than a hundred journals, a card and billiard-room, a lecture hall and a restaurant, and has begun a railroad library which already numbers more than 400 volumes. It sometimes makes excursions to visit railroad improvements, etc. The yearly charge to resident members is six dollars. The rooms are open from one o'clock in the afternoon until midnight. The nearest approach to an institution of the kind in this country is that at the rooms of the Master Car-Builders' Association in New York; and it is not the fault of those who support this institution that it is not expanded to cover the ground and include the number and variety of members that make the Vienna Club so useful and pleasant.

THE GRAND TRUNK REPORT for the first half of the year 1878 shows that the company in that period of six months had gross receipts of \$3,085 per mile of road worked, earned at a cost of \$2,336 for working expenses, and so leaving \$749 as net earnings (as the half-year's income of a capital of \$108,600). Interest and rentals absorbed \$511 of this amount, and \$235, or all but \$3 of the balance, was paid as a dividend on the 5 per cent. "perpetual debenture stock," which is itself a kind of bond—at least forms a fixed charge on the revenues. This is pretty close working, but the company is without floating debt, and the debenture stock which absorbed \$235 per mile does not work like a mortgage debt if the interest is not paid. The interest goes on accumulating, but the owners of these securities have no power to foreclose, obtain a receiver or otherwise change the management of the property because of the default.

Though this result is not a very satisfactory one it is still a little better than that for the corresponding half of 1877, the gross receipts being 2.39 per cent. greater and the working expenses 1.50 per cent. less.

The first half of 1878 was decidedly unfavorable for through traffic, from which the Grand Trunk usually derives a large part of its earnings. Most of the half-year there was probably no profit whatever on the east-bound traffic, which forms 75 or 80 per cent. of the whole. The comparison, however, is with a period when a similar state



of things prevailed—when, indeed, the largest part of the through freight in both directions was carried at the extremely low rates made during the savage competition of 1876. Whether the traffic was as much heavier on the Grand Trunk this year as on the trunk lines generally, we are not able to tell by the abstract of the report in the English papers, which does not give passenger and tonnage mileage, but only the number of passengers and tons carried. The latter show 1.2 per cent. more passengers and nearly 10 per cent. more tons of freight.

THE GRAIN MOVEMENT OF 1878 will evidently be much the largest on record. For the first ten months of the year the seven Atlantic ports have received 212,000,000 bushels of grain of all kinds, not including flour, against 140,000,000 bushels in 1876, when the movement was larger than ever before, and 133,000,000 last year. There has been no time in the history of this country, rapid as its development has been heretofore, when a more astonishing increase in production has been exhibited, and it seems almost incredible that within two years the increase over the heaviest business ever known should be more than one-half. If it were the total production, it would be impossible; but the seaboard receipts are simply the marketable surplus of a crop which is usually ten times as great. And the great movement of this year is due simply to the coincidence of two bountiful crops. The year of the greatest movement heretofore there was a very bad wheat harvest and an unusually light wheat movement for half of the year. This year there has been an abundance of grain, both wheat and corn, to be carried both before and after the harvest. Yet with this unprecedentedly large stock of grain to be transported, the grain-carriers east of Chicago and St. Louis have probably not often made smaller profits from carrying grain. Apparently it will not be possible to make a great deal directly from this business in this district, under ordinary circumstances; the freight has to be carried so far that with ordinary prices in the Eastern and European markets little is left to the producer after paying even the bare cost of transportation. At current rail rates, low as they are, it costs 31 cents a bushel to send a bushel of corn from Kansas City to New York, where it brings about 47 cents. Evidently at current prices a large part of the more recently settled farming country of the United States is too far from market to be able to grow coarse grain, if it can wheat, at a profit, unless the railroads make a present of a part of the cost of transportation, which they frequently have done in their struggles with each other.

THE PENNSYLVANIA RAILROAD DIVIDEND is an event of considerable importance to more persons than the stockholders immediately concerned; for this road is most emphatically a trunk line, serving as an outlet for a vast number of other roads, whose condition it may be supposed in some degree to reflect, though, of course, its special financial needs affect its capacity to pay dividends. It is eighteen months since the last dividend was paid by this company, and there have been those who did not hesitate to say that it would not soon be able to pay another. For many years, and until 1875, 10 per cent. was paid yearly; in 1875 and 1876 8 per cent. was paid, and the dividend periods were changed from half-yearly to quarterly. In 1877 2 per cent. was paid the first quarter and 1½ the second quarter, and before the third period came the great destruction of the July strikes, since which no dividend has been declared until now. A 2 per cent. dividend by this company requires over \$1,375,000, it having a larger capital stock than any other American dividend-paying company except the New York Central & Hudson River. The dividend, it must be remembered, is in addition to an investment of net earnings made in the securities which the company has guaranteed, and which, generally, pay a high rate of interest on their present price, which makes them particularly desirable possessions for the Pennsylvania Railroad Company.

The announcement of this, the first dividend for eighteen months, as a "semi-annual" dividend, and the resolution to change from quarterly to half-yearly dividends hereafter, may be regarded as an intimation that dividends may be expected regularly hereafter.

THE EAST-BOUND POOL will be considered at a meeting to be held in New York on Friday of this week at which both the Eastern and the Western Executive Committees are to be present, and it will be possible to conclude all the points necessary for the efficient beginning of a general east-bound apportionment. Meanwhile the places that have agreed upon divisions are not waiting for Chicago and Cincinnati and the other places, if any, that may be found necessary to cover the whole ground, but have gone to work in earnest, and traffic is now divided at St. Louis, Louisville, Indianapolis and perhaps Peoria. Of course it will not be possible to maintain rates at these places if there should be cutting elsewhere, but these organizations can at least prevent cutting from beginning at these places, and will be all ready to complete the combination when the other places come to terms. A recent contract at a cut rate from Kansas City by a route which does not pass through any of the six places proposed as pooling points has emphasized the insufficiency of these places, and other points may be added by the time Chicago and Cincinnati have come in. Rates so far seem to be pretty well maintained, and an advance in lake rates during the past week and the near approach of the close of navigation ought to make it easier to keep them up, but in view of last year's experience it will not do to depend on this. Then rates, which had been maintained most satisfactorily and much higher than now throughout the fall months, began to yield the first week after navigation closed, and by January had so gone to

pieces that it could hardly be said that there were any rates. With or without vessels, there will not be so much traffic that every railroad will not be anxious to get more.

THE RAIL GRAIN MOVEMENT, though comparatively light from Northwestern markets this season, has been large without precedent on the New York railroads which compete with the canal. During the six months ending with October, during all of which the canal was open this year, the receipts at New York by rail and by water for the past two years have been:

	1878.	1877.	Increase.	P. c.
By rail.....	30,406,645	16,497,716	13,908,929	84.2
By water.....	52,358,532	35,466,927	16,891,606	47.6
Total.....	82,765,178	51,964,643	30,800,535	59.2

The percentage of increase was thus 84 per cent. by rail to 47½ by canal. In the year of heaviest rail receipts heretofore only 41,000,000 bushels were received in the whole year, and during the six months in question that year only 22,300,000 bushels were received by rail, against 30,400,000 bushels this year.

Thus, the New York railroads, during the season that they have been competing with the canal, have carried 36 per cent. more grain this year than ever before. They carried 45.7 per cent. of the whole during the same six months in 1876, 24.4 in 1877, and 37 per cent. this year. The canal, too, it must be observed, has carried more this year than ever before, and latterly it has gained largely on the railroads. The latter carried 63 per cent. of the total in August last, 37.4 per cent. in September, and 20½ per cent. in October. They carried wholly without profit, however, in August, probably; while since that month their rates have been as high on the grain taken at Buffalo as on most of their through freight, and probably high enough to leave same margin of profit to the trunk lines.

"THE WESTERN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS," which is to be organized at a meeting in Kansas City on the 19th inst., will occupy the district next west and south of that of the Central Association, recently organized in Chicago, the invitation calling for representatives of all roads south of Minnesota and west of the Mississippi. This is perhaps as good a division as could well be made, and from St. Louis southward it divides the railroads evenly. North of St. Louis, however, it cuts sharp in two the most important Chicago railroads, including the Chicago & Alton, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific and the Chicago & Northwestern, while the Chicago, Milwaukee & St. Paul doesn't fit at all well into either association's district. But there is no reason why one company should not be represented in more than one association, the important thing being to get together, so far as possible, those lines whose business has such connection as to require considerable common action or negotiation. The Western Association will have most of the western immigration traffic to look out for—the Nebraska, Kansas and Texas business. There will then be room left for an "Eastern" association, from Toronto, Buffalo, Pittsburgh and Wheeling to Baltimore, the sea-coast and New England, and a "Southern" association, bounded by the Potomac and the Ohio on the north, the Mississippi on the west, and the Atlantic and the Gulf on the east and south. The rest of the world, that is, New England, has had its association for some months.

THE TRUST FUND OF THE PENNSYLVANIA RAILROAD COMPANY, recommended by the directors in the last yearly report and indorsed at the stockholders' meeting last March, has but just been established. The directors were left to arrange for it at their discretion, and they have done so first by establishing a board of managers of the fund, to consist of the President, one Vice-President, and three directors, who will make the investments; and by directing that \$50,000 be set apart each month, beginning Nov. 1, to form the fund. This is a smaller amount than seems to have been contemplated last spring, being less than 1 per cent. on the stock, but this is only the regular minimum amount to be invested: the directors are authorized once a year, or oftener, "after payment of dividend to the stockholders," to make further appropriations to the fund, but not more than will make, with the monthly \$50,000, 2 per cent. on the stock (\$1,377,000) in a year. This may be interpreted to mean that \$600,000 per year will be invested in the fund, without regard to dividends, but no more unless there is a surplus after paying a dividend at some rate, which, in view of the one just declared and the change to half-yearly periods, stockholders will probably interpret to mean that they are to get 4 per cent. a year before anything more than \$600,000 a year is paid from the net earnings into the fund. This would make the stock at present prices return about 6 per cent. upon its cost. It has advanced a little since the dividend was declared.

LAKE RATES have advanced decidedly during the past week (ending with Tuesday last), as was inevitable, because insurance rates are advanced on the 1st of November. They closed Tuesday of last week at about 3 cents per bushel for corn and 3½ for wheat from Chicago to Buffalo, but advanced a quarter of a cent the next day, and so went up until the quotations at this time are about 3½ cents for corn and 4 to 4½ for wheat.

Canal rates have fluctuated a little, but have never been higher than the closing rates last week, but most of the time a trifle lower on wheat and oats, closing Tuesday last at 7½ for wheat, 6½ for corn and 4½ for oats from Buffalo to New York, which are the same as last week's closing quotations, except for wheat, which is ½ cent lower.

Ocean rates are decidedly higher on grain by steam to Liverpool, but apparently with scarcely any change on other freights and sail freights generally. On Monday last 8d. per bushel was paid for wheat by steam to Liverpool. Considerable shipments of oysters are now made, for which 5s. per barrel is the common rate.

## EDITORIAL LETTERS.

### II.

#### OBSERVATIONS IN CLEVELAND, TOLEDO AND DETROIT.

Journeys from one principal city to another on the main lines of railroad are now usually so uneventful that a traveler finds little to record thereafter. The time from Altoona, from which the last letter was dated, to Pittsburgh is only about 4½ hours, and in a drawing-room car the journey is made in luxurious ease and without fatigue. Only a few hours were spent in Pittsburgh, the next stop being at Cleveland. The most noticeable object between these points was the new bridge across the Ohio River where the Pittsburgh & Lake Erie Railroad crosses. This is an iron bridge with one very long channel span, the north end being carried for a long distance over the low ground and over the Cleveland & Pittsburgh Railroad. The scenery at this point is very picturesque, and the bridge is carried over the river high above the water level, so that it becomes a very striking object as the train on the latter road approaches and passes under it.

At Cleveland we found little of interest to report in railroad matters. A new viaduct is now in progress in the city which will form a wide thoroughfare leading from the high ground in the centre of the business part of the city across the Cuyahoga River to the regions beyond. The draw span, we are told, will be the largest in existence. The west end of the roadway will be carried on stone arches. The whole structure is about two-thirds of a mile long and the cost counts by millions.

There was but little opportunity of looking around among the shops and manufactories in Cleveland. The Otis Iron & Steel Company is busy on orders from various roads and is making a large number of steel axles for the New York elevated railroads. A new laboratory and testing-room has just been finished, which is the most complete place of the kind probably in the country. Every chemical appliance that can be needed is provided, and all arranged in the most convenient way. Evidently the proprietors of these works believe in knowing what they are doing, and doubtless the high character of the material produced is due largely to the fact that the aid of science has been called in to guide the practical men. At the Cleveland & Pittsburgh shops but little is done excepting to keep up repairs, and the work of the Lake Shore road is now nearly all done at Elkhart. Considerable attention has been given lately on this road to signals, and various devices have been tried. One of those in use near the passenger station is a species of semaphore of a right angle or L shape. This is located at the switches which control the movement of trains outside the depot, and the semaphore can be placed in the following positions, and then has the significance printed under each below:

- (1). All trains must stop.
- (2). Trains going east must stop.
- (3). Trains going west must stop.

- (4). Trains may proceed in either direction.

The semaphore is attached at its angle by a shaft having a pinion on it which is operated by a rack on a rod which extends from the top of the post to the bottom, and is worked by a lever at the base. Instead of the spectacle frame, which is ordinarily used with the semaphore (shown in the illustration in the *Railroad Gazette* of Oct. 4, page 477), the signal lamp is attached to the rod which works the pinion, and is inclosed in a vertical tin case provided with lenses of glass of different colors. The lamp is thus raised and lowered with the rod, and the lenses are located so that with any given position of the rod the lamp will come opposite a lens of a color which indicates at night what the position of the signal does in day time. The arrangement is ingenious, but we are inclined to believe that the same thing can be accomplished, and with a simpler code of signals, by the use of an ordinary double semaphore, like that illustrated in the number of the *Railroad Gazette* already referred to. With this the following positions of the semaphores would correspond with the signals above.

- (5). All trains must stop.
- (6). Trains going east must stop.
- (7). Trains going west must stop.

- (8). Trains may proceed in either direction.

It will be noticed that the signal to stop, shown at (1), to trains going in each direction, is different from that given at (2) and (3). In the one case the semaphore arm extended at right angles on the left side of the post means stop, whereas in the first case the arm elevated at an angle of 45 degrees means stop. The advantage with a simple semaphore, whether with a single or double arm, is that the arm extended at right angles on the left side of a post al-



ways means stop. The simplicity of this rule, if semaphores were used for all main-line signals, must, it is thought, add much to the safety of railroad traffic. The Lake Shore signal introduces two different positions of the semaphore arm to indicate stop, and thus seems likely to cause confusion. The arrangement of a lamp inside of a case instead of a spectacle frame may be an improvement over European practice, especially in our severe climate.

There has been a good deal of attention given of late on the Lake Shore road to the lubrication of journal boxes. It was one of the first lines to use paraffine, and like nearly all innovations its use met with much opposition. It is now used during the winter months, without the addition of any other oil, but it is found that in summer it becomes so limp that it is hard to keep it in the axle-boxes. During the summer months it is therefore mixed with some other lubricant to give it more "body." The following statement will show some of the results on the Lake Shore road of using paraffine on passenger cars, instead of a more expensive lubricant.

Date.	Total cost of oil.	Number of hot boxes.
From Jan. 1 to July 1, 1876.....	\$5,867.30	535
" " " " 1877.....	3,319.76	412
" " " " 1878.....	1,865.15	332

On the Pennsylvania and also on the Wabash road crude black oil is now used as a lubricant for all journal bearings of cars. The oil question seems almost a hopeless one; at least it seems as though we never would get any exact data about it. The keeping of accounts of hot boxes and the cost of oil, as is now done on a number of roads, promises to shed some light on this question. It is certain, though, that there is no part of the machinery of railroads which is still in so undeveloped and rude a condition as the axle-boxes and bearings of railroad cars. The dust-guards in use seem like the rude device of some inexperienced apprentice, and are perhaps generally as ineffective as any mechanical contrivance well could be.

As we are on the subject of axle-boxes, we will anticipate a little, by referring to the roller bearings which Mr. Kohler, the Master Car-Builder of the Wabash road, has in use. He now has a number of cars equipped with them, which have been running for over a year. The difficulty in using them is that if an axle has a soft or defective place in it, the rollers soon make an indentation in it and thus get it "out of round." For this reason a steel axle works very much better with the rollers than an iron one. There were several of the rollers in the shop which had very suggestive flat places worn in them, showing that they are liable to the same ills that all similar devices have been heretofore.

At the Pullman shops in Detroit, Mr. Bissell, the Superintendent, is using his "stop wedge" and a collarless journal with much success. This was illustrated in the *Railroad Gazette* of Oct. 5, 1877, page 443. It seems to be steadily growing in favor.

Mr. A. M. Wellington, an old contributor to the *Railroad Gazette*, is now employed on the Atlantic & Great Western Railroad and has recently made a very interesting series of experiments on train resistances which will be put into the form of a paper and presented at the next annual meeting of the American Society of Civil Engineers.

At Toledo there is not much to interest a railroad man excepting the car shops of the Wabash road, which also has its general offices there. At the former Mr. Kohler is building some new cattle and box cars, and maintaining repairs. He is using Safford's draw-head and a continuous draw-bar. Both of these devices are coming into use rapidly. The first seems to be a requirement when the train loads are increased, as they are now very generally on all roads. In the general offices the minds of those in charge have been turned in the direction of economy, and some interesting results have been accomplished, very largely by the increase of train loads. Any one who has any doubt about the uses of adversity may learn what good it sometimes accomplishes if they will observe the methods which it has suggested for diminishing the expenses and cost of carrying passengers and freight on railroads. On nearly every road economies are now effected which, before the "hard times," were supposed to be impossible. The inevitable result must be that a revival of business must bring with it an era of prosperity to many roads which have long been a stranger to it.

The Smith Bridge Company is quite busy on highway bridges, chiefly iron, or combination bridges of wood and iron.

In Detroit railroad business generally seems to be dull with the exception of a few establishments engaged directly or indirectly in the manufacture of cars. Of these the Michigan Car Works is the largest and most important. They are located at the junction of the Michigan Central and the Grand Trunk roads, and they have direct communication with the Canada Southern, Michigan Southern, Flint & Pere Marquette and other Michigan roads, so that their facilities for shipping are of the best. Detroit being located so near the great lumber regions of Michigan and Canada, and the iron of Lake Superior, has perhaps better means of procuring good materials for the construction of freight cars than any other city in the country.

The works of the Michigan Car Company occupy about 15 acres of ground. This company seems inclined to make good use of all the opportunities which Detroit affords for supplying lumber of the best quality. About 5,000,000 feet are kept constantly on hand. This is allowed to season before it is used. Between 800 and 900 men are employed in the shops, and last month 353 cars were built. Of these 300 for the Lake Shore road were finished in 22 days. At present 14 cars per day are finished.

All the wheels and other castings are made in the foundry. About 200 wheels are cast per day and 30 tons of iron is melted in the same time in the department devoted

to miscellaneous castings. Besides the new cars built, from 10 to 15 old cars per day are thoroughly repaired.

The company has bought the forge formerly known as Baugh's forge. In connection with this it has put up a rolling mill, and is now making 20 tons of bar-iron and about 75 axles per day. The business of this company has grown very rapidly, and it is now probably doing more work than any other similar establishment in the country. The great demand for freight cars this year has made the business of car-building profitable, a condition of things which few establishments have been accustomed to for some time past.

At the Michigan Central Railroad car shops, which are also near the Grand Trunk junction, but little work is in progress excepting repairs. These shops cover a great deal of ground, and are laid out on a very extensive scale. Mr. Miller, the Master Car-Builder, has been experimenting with 42-in. cast-iron wheels and now has put 96 of them under cars. Of these 22 have been taken out, and have averaged 28,940 miles. The greatest mileage made by any of them was 64,000 miles. A few of the wheels taken out are still good for further service. The mileage of the remaining wheels will of course be much greater than that of those first taken out, as the poorest wheels always fail first. It will be seen, though, that the average mileage is thus far much lower than might have been expected.

The Detroit Bridge & Iron Works are doing comparatively little work at present, although the prospects for future orders, it is reported, look promising. In connection with the bridge works there is a forge which is now comparatively busy on car axles.

The Griffin Wheel Foundry has been built within a year or two adjoining the bridge works. The foundry is managed by the elder Mr. Griffin and his two sons. The main building is 170 by 60 feet, and is provided with two 5-ft. cupolas. One part of the foundry is devoted to wheels, and the other to general work. The wheel foundry has three swing cranes, and at present about 55 wheels are made per day. The other department is devoted to general work, chiefly for railroads. The foundry is very well arranged, and has the air of a successful establishment. The iron used for the manufacture of wheels is from Lake Superior, Salisbury and Alabama. The latter is spoken of very highly and is regarded as a very superior iron for the manufacture of wheels.

The shops, and in fact the whole, of the Detroit & Milwaukee Railroad seems to be in a transition state, as the road is in process of passing into the hands of the Great Western of Canada. Mr. C. F. Hanson, formerly Master Mechanic, has been transferred to London, Canada, and Mr. Frederick Parker, from the Great Western road, has been appointed to fill his place. Mr. W. J. Morgan is acting as General Superintendent, Mr. S. R. Callaway, the former Superintendent having resigned and become Superintendent of the Detroit & Bay City road.

Perhaps the greatest evil from which Michigan railroads are now suffering is that there are too many of them, an evil, too, which is now irremediable.

## General Railroad News.

### MEETINGS AND ANNOUNCEMENTS.

#### Meetings.

Meetings will be held as follows:  
Utica & Black River, annual meeting, at the office in Utica, N. Y., Nov. 13.  
Southern Railway & Steamship Association, annual convention, in Atlanta, Ga., Nov. 26, having been postponed to that date from Nov. 7.

#### Dividends.

Dividends have been declared as follows:  
New York, Providence & Boston,  $2\frac{1}{2}$  per cent., quarterly, payable Nov. 11.  
Pullman Palace Car Co., 2 per cent., quarterly, payable Nov. 15.  
Pennsylvania, 2 per cent., semi-annual, payable to ladies only Nov. 30; to all others Dec. 1. Transfer books closed Oct. 31.  
Cleveland & Pittsburgh (leased to Pennsylvania Company),  $1\frac{1}{4}$  per cent., quarterly, payable Dec. 2.

#### Foreclosure Sales.

The Omaha & Northwestern road was sold at Omaha, Neb., Oct. 24, under foreclosure of the first mortgage, and bought by the Union Trust Company, of New York, Trustee, for account of the bondholders. The road extends from Omaha north by west to Tekamah, 47 miles; its funded debt, upon which interest has been in default since 1874, was \$618,000. In 1877 its net earnings were \$7,722. A plan of reorganization has been adopted.

#### Southwestern Railway Association.

The regular monthly meeting was held at the Grand Pacific Hotel in Chicago, Oct. 29, with a full attendance. It had been expected that the subject of the alleged cutting of rates on meats from Kansas City to the East, under special contracts with some large packing houses, would be brought up, but no direct mention was made of this matter. After a short discussion it was resolved to order a slight increase in east-bound rates from Missouri River points, and the following were adopted: Missouri River points to St. Louis, 25 cents per 100 lbs.; to Chicago, 31 cents; to Milwaukee,  $33\frac{1}{2}$  cents; to Toledo, 39 cents.

#### Indianapolis East-Bound Pool Meeting.

At a meeting of representatives of the Indianapolis roads in that city, Oct. 29, the details of the pool on east-bound freight were finally agreed upon. The division of the business from Indianapolis is to be as follows: Cleveland, Columbus, Cincinnati & Indianapolis, 35 per cent.; Pittsburgh, Cincinnati & St. Louis, 32 per cent.; Indianapolis, Peru & Chicago, 17 per cent.; Indianapolis, Cincinnati & Lafayette, 10 per cent.; Cincinnati, Hamilton & Indianapolis, 6 per cent. It was agreed to appoint Mr. S. F. Pierson Commissioner to take charge of the business and manage the division.

#### Southern Railway and Steamship Association.

The following notice from President Joseph E. Brown was addressed to General Commissioner Powers, Oct. 30:  
"I am informed that some of the railroad managers west of Chattanooga are unwilling to come through that city, on

account of yellow fever (and on account of the fact that provisions in their life insurance policies forbid it) to attend the meeting of the Southern Railway & Steamship Association, on the seventh of November, and they request the postponement until a later day. There are other reasons I think important to the interest of the Association for further postponement, which I will fully explain to them when they meet. You will therefore notify all the lines and parties interested that the meeting of the Association is postponed until Tuesday, the 26th of November."

In accordance therewith, Mr. Powers issues the following circular:

"Please take notice of postponement of convention as above to the 26th of November, 1878, at three o'clock p. m., at Kimball House, Atlanta, Georgia.

"Representatives Green Line roads and their connections, and representatives of all transportation companies interested in the freight business of the South and Southwest, are cordially invited to attend this convention.

"The Committee on Classification, and the Committee on Rates and Divisions will meet on Monday, Nov. 25, 1878, at ten a. m."

### Convention of Railroad Commissioners.

It is now announced that the following officers have signified their intention of being present at the convention of railroad commissioners which is to meet Nov. 12 at Columbus, O.: Auditor of Railroad Accounts of the United States, the State Engineer of New York, the Secretary of Internal Affairs of Pennsylvania, the Railroad Commissioners of New Hampshire, Massachusetts, Connecticut, Virginia, Ohio, Michigan, Illinois, Wisconsin, Iowa and Minnesota, and the Transportation Commissioners of California.

### ELECTIONS AND APPOINTMENTS.

**Baltimore & Ohio.**—Mr. M. H. Smith, late General Freight Agent of the Louisville & Nashville, has been appointed Assistant to the President of this company. Mr. Smith has unusual qualifications for such a place.

**Mr. John Bradshaw**, Assistant Master of Road, is appointed Acting Master of Road, in place of John L. Wilson, resigned.

**Boston & Albany.**—Mr. Arthur Mills has been appointed Assistant General Freight Agent. He has been for some time General Freight Agent of the Boston, Clinton, Fitchburg & New Bedford road.

**Boston, Winthrop & Point Shirley.**—At the annual meeting in Boston, Oct. 29, the following directors were chosen: Francis French, Frank H. Hills, Samuel G. Irwin, Clarence A. Parker, John M. Wales.

**Brotherhood of Locomotive Engineers.**—At the recent convention in Indianapolis the following officers were chosen, Grand Chief Engineer Arthur holding over; Second Grand Assistant Engineer, W. H. Neal, St. Paul, Minn.; Third Grand Assistant Engineer, Daniel Bennett, Chillicothe, O.; Grand Secretary, T. S. Ingraham, Cleveland, O.; Grand Guide, J. D. Rogers, Philadelphia; Grand Chaplain, Geo. W. Tyer, Indianapolis. Messrs. Bennett, Ingraham and Tyer are re-elected. The next convention will be held at Kansas City.

**Central Pacific.**—Mr. A. N. Towne, General Superintendent, is promoted to be General Manager of this company's lines, which is a new office. Mr. John Corning, Assistant General Superintendent, succeeds Mr. Towne as General Superintendent, and Mr. J. A. Fillmore, Superintendent of the Sacramento and Oregon Divisions, is appointed Assistant General Superintendent.

**Credit Valley.**—At the annual meeting in Toronto, Ont., Oct. 24, the following were chosen: George Laidlaw, President; C. J. Campbell, Vice-President; C. Arthur, R. W. Elliott, Capt. Gardner, Robert Hay, John McNab, Angus Morrison, J. L. Morrison, Directors.

**Dakota Southern.**—At the annual meeting in Yankton, Dak., Ter., Oct. 31, the following directors were chosen: D. T. Bramble, N. H. Briggs, W. W. Brookings, J. R. Hanson, James C. McVay, George E. Merchant, C. G. Wicker. The board elected officers as follows: President, C. G. Wicker, Chicago; Vice-President, W. W. Brookings, Yankton, Dak.; Secretary, J. R. Hanson, Yankton, Dak.; Treasurer and Superintendent, George E. Merchant, Sioux City, Ia.; Auditor, C. H. Longman, Sioux City, Ia.; Solicitor, N. H. Briggs, Sioux City, Ia.

**Danbury & Norwalk.**—At the annual meeting in Norwalk, Conn., Oct. 31, the following directors were chosen: O. Benedict, R. P. Flower, H. H. Hollister, L. P. Hoyt, A. S. Hurlbut, James W. Hyatt, F. St. John Lockwood, D. P. Nichols, W. C. Street, E. S. Tweedy. The board re-elected Roswell F. Flower President; James W. Hyatt, Vice-President; Harvey Williams, Secretary and Treasurer.

**Danville & Pekin.**—The purchasers of the Indianapolis, Bloomington & Western road have organized this company in Illinois by the election of the following directors: John L. Farwell, G. W. Parker, R. E. Williams, F. W. Peck, J. D. Campbell. The board elected John L. Farwell President; Charles L. Capen, Secretary and Treasurer. This company will be consolidated with one to be organized in Indiana.

**Delphos, Bluffton & Frankfort.**—Mr. Charles Bell has been appointed Superintendent. His office is at Bluffton, Ind.

**Detroit & Bay City.**—Mr. S. R. Callaway has been appointed General Superintendent. He has held for some time the same position on the Detroit & Milwaukee road.

**Detroit & Milwaukee.**—Mr. Broughton, General Manager for the purchasers, has made the following provisional appointments, pending the complete reorganization: Jas. H. Muir, Secretary; Alfred White, Assistant to the General Manager; Geo. Masson, Engineer of the line, with charge of that portion of the Great Western Railway between Windsor and London, under Mr. Joseph Hobson, the Chief Engineer of the Great Western Railway; John S. Lorimer, Storekeeper, the title of Purchasing Agent being abolished; Thomas Tandy, the present Assistant Freight Agent of the Great Western Railway, is appointed to the same office on this line, with residence in Detroit. Mr. S. R. Callaway was continued as Superintendent, but has since resigned.

**Galveston, Harrisburg & San Antonio.**—Mr. Daniel A. Sullivan has been appointed General Baggage Agent, in place of W. F. Horne, promoted.

Mr. Frank Newland has been appointed Roadmaster of the Eastern Division, from Houston to Schulenburg, and Mr. Joseph Spaulding Roadmaster of the Western Division, from Schulenburg to San Antonio.

**Illinois Midland.**—Mr. H. K. White has been appointed Auditor, in place of M. C. Tully, resigned.

**Louisville Pool Commissioner.**—Mr. Campbell, for some time agent of the Ohio & Mississippi Railway in Louisville, has been appointed Commissioner to take charge of the apportionment of through freight to the East from and through that city.



**Massachusetts Central.**—At the annual meeting in Boston, Oct. 30, the following directors were chosen: Silas Seymour, Charles A. Cutting, J. W. Rollins, Boston; Francis Brigham, James T. Joslyn, Hudson, Mass.; Charles M. Harris, West Boylston, Mass.; James S. Draper, Wayland, Mass.; J. Edwin Smith, E. B. Shattuck, Worcester, Mass.; Lewis Dudley, Luke Lyman, Northampton, Mass.; Franklin Bonney, Hadley, Mass.; William A. Dickinson, Henry F. Hills, Amherst, Mass.; Milton Courtright, New York.

**Memphis & Little Rock.**—Mr. Charles L. Williams has been appointed Acting General Manager, in place of M. B. Pritchard, deceased.

**Milwaukee, Lake Shore & Western.**—Mr. A. L. Cary has been chosen Secretary, in place of S. S. Sands, resigned, and Mr. H. G. H. Reed Treasurer, in place of Charles Dana, resigned. Both will have their offices in Milwaukee, Wis. Mr. Reed is also General Superintendent and Mr. Cary Attorney. The changes are made to comply with the Wisconsin law requiring general offices to be kept in the State.

**Missouri, Kansas & Texas.**—Mr. L. F. Sheldon having resigned the superintendency of the Cherokee and Neosho divisions, Mr. Edward Harding, in addition to his other duties, has been appointed Superintendent of the Cherokee Division, with office at Denison, Tex.; and Leonard Pearson Superintendent of the Neosho Division, with office at Parsons, Kan.

**Newburgh, Dutchess & Connecticut.**—The offices of John A. Schultze, President and Treasurer, and W. A. Wells, Secretary, have been removed from New York to Moore's Mills, Dutchess County, N. Y.

**New Jersey Midland.**—The following circular is dated Oct. 28:

"On and after Nov. 1, prox., the position of Master Mechanic will be dispensed with. Mr. W. C. Ennis is hereby appointed Engine and Shop Foreman, and as such will have charge of all repairs to locomotives and cars on and after said date. Engineers and all other employees in this department will report to him, and his orders must be obeyed."

**New York & New England.**—The addition of the Hartford, Providence & Fishkill to the lines worked by this company makes necessary a reorganization of its officers, and the following appointments are announced: H. M. Britton, Superintendent, and J. T. McManus, Assistant Superintendent of the Eastern Division, which will include the New York & New England from Boston to Willimantic and the Hartford, Providence & Fishkill from Willimantic to Hartford; L. W. Palmer, Superintendent Providence Division (Willimantic to Providence); J. T. McManus, Superintendent Western Division (Hartford to Waterbury).

Mr. A. C. Kendall remains General Passenger Agent, and Mr. Lucius Tuttle is appointed Assistant General Passenger Agent. Mr. George H. Williams remains General Freight Agent and Mr. A. G. Tuttle is appointed Assistant General Freight Agent. Mr. Thomas Nixon is appointed General Auditor, and Mr. F. E. Jones Auditor of Freight Receipts. The two Messrs. Tuttle were General Freight and General Passenger Agent of the Hartford road.

**Paducah & Elizabethtown.**—Mr. F. S. Fauntleroy has been appointed Auditor, in place of R. W. Brown, resigned. Office at Elizabethtown, Ky.

**Railroad Conductors' International Insurance Association.**—At the first annual meeting, held in Indianapolis, Nov. 29, the following officers were chosen: President, Geo. W. Tyler, Indianapolis, Cincinnati & Lafayette; First Vice-President, J. W. Redman, Cincinnati Southern; Second Vice-President, J. Ward Boyles, Editor Conductors' Brotherhood Gazette; Third Vice-President, B. C. Skillenger, Jeffersonville, Madison & Indianapolis; Secretary and Treasurer, J. M. Short, Cincinnati, Hamilton & Indianapolis; Directors, D. A. Parmelee, Indianapolis, Bloomington & Western; O. W. Merrill, W. A. Cummins, Pittsburgh, Cincinnati & St. Louis; C. H. Briggs, Indianapolis & Vincennes; H. M. Mounts, Jeffersonville, Madison & Indianapolis.

**Southern Pacific, of Arizona.**—Mr. C. F. Crocker has been chosen President, in place of David D. Colton, deceased. Mr. David Nahr succeeds Mr. Colton as a director of the company.

**Spartanburg & Asheville.**—The United States Circuit Court has appointed Col. James R. Anderson, Receiver. He is Superintendent of the road.

**Vermont & Canada.**—The new board has elected Bradley Barlow, President, and A. G. Safford Secretary and Treasurer.

PERSONAL.

—In the town of Pittsfield, Mass., there is a public building known as the "Berkshire Athenaeum," presented by Thomas Allen, President of the Iron Mountain Railroad. The Pittsfield Sun notes that a fine photograph of Mr. Allen has been recently hung in the main hall of this building and adds:

"Scarcely a day passes but some one asks, regarding Mr. Allen, who he was? where did he live? etc., and in order to avoid these questionings the following has been placed under it: 'This photograph of Hon. Thos. Allen, the donor of this building, was taken at St. Louis, Mo., in May 1878. He was son of Jonathan and Eunice Williams Allen, born in Pittsfield Aug. 29, 1813, graduated at Union College 1832, admitted to the bar of New York 1835; elected printer to Congress 1837; removed to St. Louis, Mo., in 1842 and married there; in the Missouri state senate from St. Louis four years from 1850 to 1853; took the first locomotive west of Mississippi in 1852; President of the Missouri Pacific Railroad five years; President of the Terre Haute & Alton Railroad one year; purchased the St. Louis & Iron Mountain Railroad in 1867 and extended it to Kentucky and to Texas, building one hundred miles a year for five years; received the degrees of A. M. and L. L. D. from Union College; moved into his new stone dwelling in Pittsfield in 1858; established his farm and buildings east of the village 1867; commenced building the Berkshire Athenaeum in 1874 and finished it in 1876.'"

—At the recent reunion of the Society of the Army of the Tennessee at Indianapolis, the toast "The Railroads in Peace and War" was responded to by Maj. Gen. J. H. Wilson, formerly commander-in-chief of the cavalry of the Army of the Tennessee, who graduated at West Point at the head of his class in 1860, and is now Receiver of the St. Louis & Southeastern Railway.

—Mr. W. H. Wood, General Passenger Agent of the New York & Oswego Midland, and connected with that road from its first commencement, has resigned his position to take charge of a division of the Western Union Telegraph Company's lines.

—Mr. Theodore M. Vail, General Superintendent of the Railway Mail Service, has tendered his resignation, to take effect upon the appointment of his successor. Mr. Vail leaves the postal service in order to accept the position of General Manager of the Bell Telephone Company, of New York.

—Mr. Selvester, who has had charge of the car department

of the Chicago, Burlington & Quincy Railroad at Galesburg, Ill., has accepted an engagement as Superintendent of the St. Charles Car Co., at St. Charles, Mo.

—Mr. Arthur Mills, General Freight Agent of the Boston, Clinton, Fitchburg & New Bedford road, has resigned his position, to accept one on the Boston & Albany road.

—Col. Thomas A. Scott, President of the Pennsylvania Railroad Company, sailed from Philadelphia for Antwerp, Nov. 4. He is accompanied by his family and expects to remain abroad until spring. His vacation was recommended by his physician, as he has been much overworked of late.

—Mr. John L. Wilson has resigned his position as Master of Road on the Baltimore & Ohio Railroad, on account of continued ill health. Mr. Wilson has held the position for 29 years, and for a time acted as Master of Transportation also.

—The Louisville Courier-Journal says: "Dr. Standiford's appointment of Mr. G. C. Breed as Assistant General Manager of the Louisville & Nashville Railroad is highly complimented by the press generally. An exchange, noticing the promotion, says:

"Mr. Breed might well be called a patriarch among the railroad men of this country. Few have had so long, varied and valuable an experience of railroad construction and management. Born in Stonington, Conn., nearly half a century ago, he has been connected with the railroad business in various capacities for the long period of twenty-eight years. He began his railroading career as a civil engineer on the Rochester & Niagara Falls Railroad. Later he served for a time in the same capacity on the Wabash Railroad. For the last twenty-two years he has been identified with the Louisville & Nashville Railroad Line. During the greater part of the duration of the war of the rebellion he was stationed at Clarksville, Tenn. During the latter part of the war he was with the Nashville & Chattanooga Railroad. In those difficult and important positions he superintended the transportation of all the supplies and munitions of war that passed over those roads at that critical period. During his career as a railroad man he has filled the position of Assistant Engineer, Resident Engineer, Chief Engineer, General Ticket Agent, General Freight Agent, Auditor, Master of Transportation, Superintendent, Purchasing Agent and Secretary to the President. These multiplied and widely diversified duties cover almost the entire field of railroading except its merely manual parts. Besides his own personal labors, Mr. Breed may be said to have educated a generation of railroad managers and superintendents in the science and art of their calling. Some of the most distinguished and eminent railroad managers and superintendents in this country have been at various times and in various capacities under his tutelage, and have learned the principles and details of their vocation from him."

—Gen. Wm. J. Sewell, Superintendent of the West Jersey Railroad, was on Tuesday last elected to the State Senate of New Jersey from Camden County for the third time.

TRAFFIC AND EARNINGS.

**Railroad Earnings.**  
Reports to the Massachusetts Railroad Commission for the year ending Sept. 30, 1878, are as follows:

	Earnings.	Expenses.	Net earn.	Earn per. of mile.	P. c. exps.
Boston & Providence	\$1,206,417	\$817,928	\$388,489	\$18.142	68.16
Connecticut River	605,436	385,633	219,803	7.606	63.69

Other earnings are reported as follows:

	1878.	1877.	Inc. or Dec.	P. c.
Chl. Mil. & St. Paul	\$6,740,956	\$6,378,445	I. \$462,511	7.4
Chl. & Northwest	11,600,804	10,191,055	I. 1,409,749	13.8
St. Louis, Iron Mt. & Southern	3,510,912	3,510,042	D. 870	0.1
Month of October:				
Bur. Cedar Rap. & Northern	\$141,619	\$171,533	D. \$29,914	17.4
Chicago & Alton	480,869	445,597	I. 35,272	7.7
Chicago, Mil. & St. Paul	823,000	1,183,133	D. 360,133	30.4
Chl. & Northwest	1,566,000	1,598,000	D. 32,000	2.0
St. Louis, Iron Mt. & So.	577,200	510,812	I. 66,388	13.0
Wabash	517,613	516,115	I. 1,498	0.3
Week ending Oct. 26:				
Grand Trunk	\$192,829	\$217,864	D. \$25,035	11.5

**Cotton Movement.**  
For the two months of the crop-year from Sept. 1 to Nov. 1, receipts at the seaboard have been:

	1878.	1877.	1876.	1875.	1874.
1,005,355	732,374	1,009,547	915,744	860,197	

Compared with the previous year, New Orleans showing a decrease of about one-third in amount, and in proportion of the total has fallen from 19 to 8% per cent. Savannah has received twice as much as last year and more than any other place—29 per cent. of the whole against 22 per cent. last year, followed by Charleston, Galveston and Norfolk in their order. The exports for the two months have been 432,842 bales this year against 252,910 last—an increase of 179,932 bales, or 71 per cent. New York leads in exports so far, followed by Savannah, Charleston and New Orleans.

**Grain Movement.**

Receipts of grain of all kinds at the eight leading Northwestern markets for the week ending Oct. 26, have been, in bushels:

	1878.	1877.	1876.	1875.	1874.	1873.
4,417,000	3,708,094	4,495,985	5,345,507	2,805,408	4,214,849	

The receipts this year are the smallest since the middle of July and 13 per cent. less than the preceding week. Most years there has been a considerable decrease about this season.

The shipments of these same markets for the same weeks have been:

	1878.	1877.	1876.	1875.	1874.	1873.
3,498,848	3,215,675	3,910,976	2,589,240	3,405,068	4,183,577	

The shipments this year are very much smaller than they have been before since August, but they are still not unusually small for this time of year.

The number of bushels and the percentages of the total of these shipments that were sent by rail were:

	1878.	1877.	1876.	1875.	1874.	1873.
891,528	661,300	1,359,100	1,213,492	321,261	742,740	
25.5 p. c.	20.6 p. c.	34.8 p. c.	46.9 p. c.	9.4 p. c.	17.8 p. c.	

The rail shipments this year have not been so small since the first week in July, and only a few times before that. They are but three-fifths the rail shipments of the previous week.

The receipts at the seven Atlantic ports for the same week were:

	1878.	1877.	1876.	1875.	1874.	1873.
5,637,689	6,374,990	4,010,233	3,765,499	3,496,749	4,349,469	

The receipts this year have been smaller but once since July; but they are still very large, and were not often much exceeded last year, and very seldom equaled in previous years.

Of the receipts at Atlantic ports this year, 62.6 per cent.

were at New York, 13.1 at Philadelphia, 8.8 at Baltimore, 7.2 at Boston, 4.2 at New Orleans, 3.8 at Montreal and 0.3 per cent. at Portland.

Receipts at Buffalo for the ten months ending with October for two years have been:

	1878.	1877.	Inc. or Dec.	P. c.
By rail	24,139,400	12,708,900	I. 11,430,500	90.0
By lake	62,271,152	51,949,792	I. 10,321,360	20.4

Total 86,410,552 64,658,692 I. 21,751,860 33.6

**Flour:**

	1878.	1877.	Inc. or Dec.	P. c.
By rail	601,300	682,400	D. 81,100	30.3
By lake	746,284	512,734	I. 233,550	45.6

Total 1,347,584 1,195,134 I. 152,450 12.7

**Grain and Flour:**

	1878.	1877.	Inc. or Dec.	P. c.
By rail	27,145,900	17,015,900	I. 10,130,000	59.0
By lake	66,002,572	54,513,462	I. 11,489,110	21.1

Total 93,148,472 71,529,362 I. 21,619,110 30.2

The great growth in rail receipts was made mostly in the winter before navigation opened.

For the week ending Nov. 4 receipts and shipments at Chicago and Milwaukee were:

	Receipts.	Shipments.
Chicago	2,690,368	2,342,100
Milwaukee	511,400	594,200

In the aggregate these are greater than for the preceding week.

For the same week receipts and shipments at Buffalo were:

	Receipts.	Shipments.
By rail	461,000	852,343
By water	1,562,456	1,588,377

Total 2,023,456 2,440,720

Total previous week 2,140,180 2,069,123

There is an increase in the rail and a decrease in the lake and canal movement, the totals showing a small decrease.

For the same week ending Nov. 4 receipts at four Atlantic ports were:

	1878.	1877.	Inc. or Dec.	P. c.
New York	3,808,267	3,693,408	I. 114,859	3.1
Philadelphia	740,300	350,621	I. 389,679	111.4

All these places show some increase in comparison with the preceding week, and a large one compared with the corresponding week last year.

Baltimore grain receipts for October were as follows:

	1878.	1877.	Inc. or Dec.	P. c.
Flour, barrels	144,868	141,328	I. 3,540	2.5

Wheat, bushels 2,629,737 1,618,996 I. 1,010,741 62.4

Corn 498,919 1,030,243 D. 531,325 51.6

Other grain 118,037 144,703 D. 26,666 18.4

Total grain 3,246,693 2,793,942 I. 452,751 16.2

Total flour reduced to bushels 3,971,033 3,500,582 I. 470,451 13.4

For the ten months ending Oct. 31 the receipts were as follows:

	1878.	1877.	Inc. or Dec.	P. c.
Flour, barrels	1,149,050	981,832	I. 167,218	17.0
Grain, bushels	34,751,081	25,914,063	I. 8,837,018	34.1

Total, bushels 40,496,331 30,823,723 I. 9,672,608 31.4

Exports for October were 59,445 barrels flour, 2,210,230 bushels wheat and 502,165 bushels corn.

The Buffalo Commercial Advertiser reports grain receipts at that port for October and the ten months ending Oct. 31 as follows:

Month:	1878.	1877.	Inc. or Dec.	P. c.
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By lake 154,593 12,880,844 12,726,251 I. 14,328,917

By rail 69,100 1,855,000 1,785,900 I. 2,360,500

Total 223,693 14,735,844 14,512,251 I. 16,689,417

Season:

	1878.	1877.	Inc. or Dec.	P. c.
By lake	746,284	69,271,152	I. 512,734	51,949,792
By rail	601,300	24,739,400	I. 802,400	12,708,900

Total 1,347,584 94,010,552 1,375,134 64,658,692

Rail shipments were 30.9 per cent. of the flour and 12.6 per cent. of the grain for the month; 44.6 per cent. of the flour and 26.3 per cent. of the grain for the season. Shipments eastward of grain received by lake were as follows:

	1878.	1877.	Inc. or Dec.	P. c.
By canal, bushels	52,854,503	42,361,006	I. 10,493,497	24.8
By rail	16,179,108	9,028,802	I. 7,150,306	79.2

Total 69,033,611 51,389,808 I. 17,643,803 34.3

Per cent. by rail 23.4 17.6

The canal opened April 15 this year and May 8 in 1877.

**Coal Movement.**

Coal tonnages reported for the week ending Oct. 26 were:

	1878.	1877.	Decrease.	P. c.
Anthracite	486,448	522,931	36,483	7.0
Semi-bituminous	77,118			
Bituminous, Pennsylvania	37,552			

Nothing definite is announced as to the continuance of the anthracite combination after Dec. 31. It is said that the Lehigh Valley will not consent to any plan which allots it less than 25 per cent. of the total production, which is more than the other companies are willing to concede.

**Siberian Wheat.**

Wheat from a new source made its appearance in Europe this year, the Danish vessel Neptune having brought a cargo from the Obi River in Siberia to Hamburg. The voyage from Hammerfest in Norway through the Arctic Sea to the mouth of the Obi and return was made in five weeks and without any serious difficulty. Siberia is a great country in extent and there are said to be almost limitless possibilities in the way of wheat raising on its vast steppes, but as long as the country is as thinly peopled and as difficult of access as at present, our Western wheat-growers will have little to fear from its competition. The voyage of the Neptune was suggested by recent explorations made in the Arctic Sea.

**Pacific Through Freights.**

Shipments of through freight eastward over the Central Pacific in September were: From San Francisco, 4,555 tons; interior points, 3,798 tons; total, 8,353 tons. Leading items of freight were 934 tons tea, 1,765 tons wool, 334 tons seal-skins and 194 tons canned goods.

**Southwestern Railway Association Rates.**

A circular from Commissioner Midgley, dated Nov. 1, says: "On and after date, and until further notice, the following rates will be charged from Kansas City, Leavenworth, Atchison and St. Joseph, on packing-house products, meaning salted provisions in bulk or in packages, lard, tallow and green hides:

	Per 100 lbs.
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To St. Louis, Hannibal, Burlington, etc. 25 cents.

To Chicago 31 "

To Milwaukee 33 1/2 "

To Toledo 39 "

"Also the following classifications: Spirits nitre and extracts (same as drugs), Class 1; tobacco in caddies or butts, two or more strapped together, 2; printed matter of all kinds (same as books), 1; iron beams, columns and girders, not more than 27 feet long, car loads, special; oatmeal, in barrels or casks, 4; portable forges (same as portable engines), 1; type-writers, D., 1; mineral water, packed in



cases, in glass, C. L., 4; terra cotta (same as earthenware); paper plates or pails, nested, 1."

#### Chicago and St. Louis Rates.

An informal meeting was held at the Grand Pacific Hotel, Chicago, Oct. 31, at which were present representatives of all the lines doing business between Chicago and St. Louis, including the Chicago & Alton, the Illinois Central, the Chicago & Eastern Illinois, the Chicago, Burlington & Quincy, the Vandalia Line, the Indianapolis & St. Louis and the Wabash. After some discussion it was resolved to adopt from Nov. 4 the rates in force last Spring. These will not, however, make any important changes from those lately in force.

#### Erie Canal.

The business of the Erie Canal at Buffalo from the opening up to Oct. 31 was as follows:

	1878.	1877.	Increase.	P. c.
Boats cleared.....	8,130	5,970	2,160	36.2
Tolls received.....	\$570,728	\$407,192	\$163,536	40.2
Av. receipts per day.....	2,854	2,301	553	24.0

The canal opened April 15 in 1878, and May 8 in 1877 making 200 days to Oct. 31 this year and 177 last year.

#### Louisville Freight Apportionment.

It is reported that the proportions of business allotted to the several railroads out of Louisville by the recent agreement to pool East-bound freight, are as follows: Jeffersonville, Madison & Indianapolis, 36 per cent.; Louisville, Cincinnati & Lexington, 31; Ohio & Mississippi, 23; United States Mail (steamboat line to Cincinnati), 10 per cent. This is for business originating at Louisville; that coming from points south and passing through Louisville goes: To the Jeffersonville, Madison & Indianapolis, 53 per cent.; Ohio & Mississippi, 32; Louisville, Cincinnati & Lexington, 15. All but that going by the Jeffersonville, Madison & Indianapolis will have to be distributed again after reaching Cincinnati.

#### A Quick Stop that Prevented Disaster.

Writing from Denver, Oct. 31, a railroad mechanic says: "They had an accident to a passenger train at Pueblo on the evening of the 28th. It ran off an open switch at 25 miles an hour. The engineer applied his brake one car-length from the switch, and the rear end of the last car stopped 10 inches beyond the switch. The train consisted of mail, baggage and one car, so that it only ran five car-lengths, including engine. It was just stopping when the tender, mail and baggage turned over on their sides, it being on an embankment. Nobody was hurt, and the sides of the tender and cars were not even scratched. The Master Mechanic released the brake two hours afterward." The brake used on this train was the Westinghouse, to which several passengers and train-men evidently owed their lives on this occasion, and the company a pretty sum of money, which will pay for a good many brake outfits.

#### OLD AND NEW ROADS.

**Asheville & Air Line.**—It is proposed to build a railroad from Asheville, N. C., up the French Broad River to a point near its head in Transylvania County, and thence through the Estatoir Gap to a junction with the Atlanta & Charlotte Air Line. The distance is about 60 miles.

**Atlantic & Great Western.**—The Court has granted leave to Receiver Devereux to equip the passenger trains of the road with the Westinghouse air brake.

Suit has been begun in the Court of Common Pleas at Akron, O., to recover some \$160,000 claimed by the Cleveland & Mahoning Valley Company as rental for the Niles & New Lisbon and Liberty & Vienna branches. The suit is a revival of an old proceeding. The rental for the main line of the Cleveland & Mahoning Valley has been settled by the Receiver of the Atlantic & Great Western.

It is reported that negotiations are nearly completed for the lease of the Atlantic & Great Western road to the New York, Lake Erie & Western Company. It is even said that the arrangements are so far advanced as to require only the assent of the Reconstruction Trustees who represent the English bondholders.

**Bald Eagle Valley.**—This company requests holders of its mortgage bonds issued in 1861 and falling due May 30, 1881, to exchange them for new 30-year bonds to be issued under a mortgage for \$900,000, executed July 1, 1878. Holders are urged to send their bonds to the Fidelity Insurance, Trust & Safe Deposit Company, of Philadelphia, before Dec. 1, as it is important that the exchange be made as soon as possible. The road is leased to the Pennsylvania, forming the chief part of that company's Tyrone Division.

**Boston, Clinton, Fitchburg & New Bedford.**—It was recently reported that negotiations for the consolidation of this company with the Old Colony had advanced so far that committees of conference had been appointed to settle upon terms. Later advices, however, say that the reports are untrue. A similar report has been started regularly every year for several years.

**Brattleboro & White Hall.**—Col. Morrison having failed to execute his contract to build this road, the board has awarded it to B. D. Harris, of Brattleboro, Vt., who was the next lowest bidder. A meeting was held last week to execute the contract and make the necessary preliminary arrangements. It is stated that the road will be built of 3-foot gauge, instead of 2 feet, as originally intended. The section under contract is from Brattleboro, Vt., to Londonderry, 35 miles.

**Bureau of Pacific Railroad Accounts.**—A Washington dispatch of Nov. 1 says: "The Auditor of Railroad Accounts to-day formally reported to the Secretary of the Interior that the Central Pacific Railroad Company has neglected to comply with any of his official requests for various reports concerning its business operations, its tariffs, present organization, financial condition, etc., with his demands that its books should be submitted to his inspection. He reports that these requests have been made and reiterated at various times since the 1st of last July, and that the officers of the company continue to reply merely that they have referred the questions of the constitutionality of the law and the power of the Auditor to make such demands to their legal counsel, and that these questions are still under advisement. The President of the company has recently sent to the Secretary of the Interior a report in compliance with the old law, but Auditor French states that this law has been replaced by the act of last session."

"The Auditor, therefore, transmits certified statements of seven distinct requests made by him to the President of the Central Pacific Company of the nature above indicated, together with certifications that none of them have yet been complied with. He concludes by recommending that proceedings under the law be instituted in each case. Secretary Schurz will to-morrow transmit the papers to Attorney-General Devens."

**Carolina Central.**—As some workmen were busy repairing the high trestle near the Pee Dee River east of Hamlet, N. C., on this road, Oct. 29, twenty-one bents, varying from 30 to 40 feet in height fell, making a great gap in the

trestle and doing much damage. The workmen were replacing the track stringers and the bents fell when the track was taken up.

**Central Pacific.**—This company's Northern Railroad is now completed and opened for business to Willows, Cal., 10 miles north of the last point noted in tracklaying and 28 miles beyond the old terminus at Williams. This branch of the Northern road is now 67 miles long, from Woodland on the California Pacific to Willows, on the west side of the Sacramento Valley.

**Chesapeake & Ohio.**—Recently the Ohio Falls Car & Locomotive Company brought suit in the New York Supreme Court against C. P. Huntington and others, directors of this company, to recover \$359,000, being the price with interest of 400 freight cars built for the road in 1873. The present suit is based upon the claims that the defendants induced the company to furnish the cars by false representations as to the amount of stock subscribed and the means of their own company. The case has now been transferred to the United States Court.

**Chicago & Alton.**—The following brief circular from General Superintendent Van Horne covers an important change:

"On Nov. 1 the Machinery and Car Departments of this company will be consolidated."

"From that date all employes of the Car Department will be subject to the direction of the Superintendent of Machinery."

The track on the extension to Kansas City is now laid west of the Missouri River to Marshall, about 20 miles from the crossing at Glasgow. Work is progressing steadily.

**Chicago, Danville & Vincennes.**—After the sale of this road under foreclosure, the bondholders were given a decree of judgment against the old company for \$1,153,826 for the deficiency in the proceeds of the sale in meeting the amount adjudged due under the decree of foreclosure. The United States Circuit Court in Chicago has now granted the old company leave to file a bill of review of this judgment. This action is based on the claim of the company that the bonds issued under the mortgage were offered and accepted in lieu of money for the bondholders' bid for the road, and that they had therefore no right to recover for any deficiency.

**Chicago, Milwaukee & St. Paul.**—Track is now reported laid on the Hastings & Dakota Division to Montevideo, Minn., which is 83 miles west of the old terminus at Glencoe, and 13 miles beyond Granite Falls. The last-named place is only 70 miles from Glencoe, and not 75, as reported a week or two since. The whole length of the division, from Hastings to Montevideo, is 157 miles. Regular trains now run to Granite Falls, but will soon be put on to the terminus.

The company has added to its line the 40 miles of the new Minnesota Midland narrow-gauge road (as noted elsewhere), which will be called the Wabasha Division.

The additions to the company's lines this year have been larger than for five years past. Last year it added only the Necedah Branch, 12 miles, and closed the year with 1,412 miles. This year it has added, by purchase or construction, the following mileage:

	Miles.
Madison & Portage, purchased.....	39
Dubuque Southwestern, purchased.....	56
Minnesota Midland, Wabasha, Minn., to Zumbrota.....	40
Iowa & Dakota Division, extended, Algona, Ia., to Sheldon.....	84
Hastings & Dakota Division, extended, Glencoe, Minn., to Montevideo.....	83
Total.....	302

A few miles correction in the length of the new extensions may be made by official statements. These additions bring the company's mileage up to 1,714 miles, to which 15 more miles on the Iowa & Dakota Division will probably be added this fall. The Madison & Portage road is only an addition in ownership, however, as it had been previously worked by the company.

The terms on which the Minnesota Midland has been acquired are not stated. The company has been much embarrassed, and was doubtless glad to give the road to any one who would provide for its debts.

**Chicago & Lake Huron.**—In the matter of the application for a receiver for the Chicago & Northeastern road, in the United States Circuit Court at Detroit, Nov. 4, Judge Brown gave his opinion refusing the application. The opinion was very long and went over the whole ground of the claim of the Port Huron & Lake Michigan bondholders to a lien on the Chicago & Northeastern road. The Judge held that under the charter of the Port Huron road, the time for the construction of its road west of Flint had expired and the franchise was subject to forfeiture; such forfeiture, however, could only be enforced by proper legal proceedings and the mere lapse of time did not authorize others to take possession. The organization of the Chicago & Northeastern must also be held legal, in the absence of proceedings to the contrary. The Judge finds, however, that in the construction of the Northeastern road money and property of the Chicago & Lake Huron were used to an extent yet undetermined, and the amount so taken is a first lien upon the road so built. Further, that the parties who advanced money on the security of Chicago & Northeastern bonds are entitled to a lien for the money so advanced, which lien may be subject to that of the Chicago & Lake Huron bondholders, if it can be shown that the parties advancing the money were aware that Receiver Bancroft was using money in his possession to build the new road.

The Court holds that the agreement of Jan. 16, 1878, was procured by false representations, but that Vanderbilt's purchase of the Chicago & Northeastern securities was made in good faith. Also, that the failure of other parties to the contract mentioned above to withdraw their assents and take prompt measures to have the contract set aside must be held as an implied acquiescence in it, and a condonation of the fraud. The complainant in the present case is therefore estopped from claiming a paramount lien as against Vanderbilt, who represents the parties who advanced money on the bonds. The complainant is thus placed in the position of a holder of junior lien, and is not entitled to a receiver without evidence that the funds of the road are being misappropriated, or some other action taken to his detriment, and such evidence has not been brought forward.

The Court has authorized the Receiver to buy and lay 500 tons of iron rails, to cost not exceeding \$40 per ton, and to issue certificates to an amount sufficient to pay for the same.

**Chicago, Rensselaer & Brazil.**—This company has filed articles of incorporation in Indiana for the purpose of building so much of the proposed new line from Chicago to the block coal fields of Indiana as will be in that state.

**Cleveland, Tuscarawas Valley & Wheeling.**—At a special meeting in Cleveland, O., Oct. 29, the stockholders voted to order the immediate construction of the Sippo Branch. This is to be about two miles long, from a point in

Massillon, O., southwest up Little Sippo Creek to the Bowman coal shaft. It will reach several new mines.

**Cincinnati & Eastern.**—This company makes the following report for the year ending Aug. 1, 1878:

Gross earnings (\$1,229 per mile).....	\$58,903
Expenses (51.47 per cent).....	30,365
Net earnings (\$596 per mile).....	\$27,628
Interest on bonds.....	19,740

Surplus.....\$8,888

The road worked for the year was 48 miles long, from the junction with the Little Miami near Cincinnati to Winchester, O. It is a narrow-gauge road.

**Credit Valley.**—At the annual meeting in Toronto, Ont., recently, it was stated that President Laidlaw had concluded arrangements through Messrs. Sanders Bros., of London, for the purchase of steel rails and fastenings sufficient for the whole line from Toronto to St. Thomas, Elora and Orangeville, subject to the required bonuses and exchanges of debentures with the municipalities. He has also concluded a financial arrangement for the purchase of necessary rolling stock. A quantity of rails and fastenings equal to about 5,000 tons has already arrived or is on the way. Tracklaying is proceeding west of Toronto toward Streetsville. The loss of the steamship Copia, with 1,700 tons of rails and fastenings, has delayed the reaching of Milton and Brampton, but the Copia's cargo has been duplicated. The section between Woodstock and Ingersoll is completed and in operation.

**Delaware & Hudson Canal.**—The business of this company's railroad lines, owned and leased, for August is reported in London as follows:

	1878.	1877.	Increase.	P. c.
Gross earnings.....	\$428,166	\$315,672	\$112,494	35.6
Expenses.....	184,312	165,007	18,705	11.3

Net earnings.....\$243,854

Net earnings.....\$150,065

Net earnings.....\$98,789

Net earnings.....62.5

The earnings of the Albany & Susquehanna (included above) were \$95,320 gross and \$55,444 net in August of this year. The cause of the great gain this year is not explained.

**Delphos, Bluffton & Frankfort.**—This narrow-gauge road is now completed and in operation from Bluffton, Ind., west by south to Warren, about 14 miles. A regular daily train is running.

**Denver & Rio Grande.**—This company's statement for September and the nine months ending Sept. 30 is as follows:

	September.	Nine Months.
Earnings:		
Freight.....	\$72,457.02	\$532,976.82
Passengers, mail and express.....	40,342.05	257,683.00
Miscellaneous.....	137.00	2,121.42

Total.....\$112,936.07

Expenses.....67,241.64

Net earnings.....\$45,694.43

Per cent. of expenses.....59.54

Net earnings.....\$26,490.03

Net earnings.....58.82

September earnings include \$4,589.58 from mails and other government business; the expenses include \$10,500 extra repairs, caused by severe wash-outs. As compared with September, 1877, there was an increase of \$34,198.97, or 43.5 per cent. in gross, and of \$5,340.09, or 13 per cent. in net earnings.

**Detroit & Milwaukee.**—The foreclosure suit has been finally disposed of, the costs and fees settled and the decree of transfer enrolled. The road is now in possession of the Purchasing Committee and managed by officers of the Great Western road. The new company has not yet been organized; it is said that it will be called the Detroit, Grand Haven & Milwaukee.

**Detroit, Hillsdale & Southwestern.**—This company is desirous of an extension from Ypsilanti, Mich., to Pontiac, complete a connection with the Grand Trunk. In a recent letter to a citizen's committee at Ypsilanti, the Treasurer stated that the road was being run at a loss and must be abandoned unless something could be done to secure more business.

**Georgetown.**—This road is now all graded, and tracklaying has begun. The equipment is on hand ready for use. The road will be about 20 miles long from Georgetown in Williamson County, Tex., southeast to Round Rock on the International & Great Northern.

**Grand Rapids & Indiana.**—This company has a small force at work grading for a branch from a point near its northern terminus at Petosky, Mich., east to Crooked Lake, some five or six miles.

**Illinois Central.**—This company began running a through sleeping coach between Chicago and New Orleans Oct. 30. This through car will be run every other day until Nov. 10, and after that every day except Sunday. The passenger business to New Orleans is just now increasing rapidly, as refugees from the yellow fever now find it safe to return.

**Indianapolis, Bloomington & Western.**—The sale of this road in Bloomington, Ill., to the Purchasing Committee representing the Corbin party of bondholders was briefly noted last week. Fuller accounts state that the representatives of what is known as the Turner party appeared immediately after the sale and announced that they had a claim against the road prior to the first-mortgage bondholders of \$1,020,000, which they should make application to the court to have paid before the confirmation of the sale of the road. A moment later a telegram was handed to Mr. Turner to the effect that the class of bondholders and creditors whom he represented had deposited in bank at New York \$2,500,000, and authorized him to bid that for the road. Of course this was too late, as the road had been sold a half-hour before. Mr. Turner then gave notice that he should ask the courts to set aside the sale, it being unjust to all classes of creditors that a piece of property as valuable as the Indianapolis, Bloomington & Western road should be sold at a trifling sum of \$1,000,000. Meantime the Purchasing Committee has made the required payments, and has organized a new company in Illinois, and will organize one in Indiana as soon as possible. The action of the Court on confirming the sale will probably depend upon the showing the Turner party may be able to make as to their ability to carry out their professed intention of paying a higher price for the road, and their making their bid before the sale was legally closed.

**Indianapolis & St. Louis.**—This company issued the following notice Oct. 31:

"In consequence of the service upon this company, on the 28th inst., of an injunction restraining the payment of the coupons due first proximo on the first-mortgage bonds of the Indianapolis & St. Louis Railroad Company by the St. Louis, Alton & Terre Haute Railroad Company, notice is hereby given that the coupons cannot be paid on that day; that the earliest possible hearing of the injunction will be sought by this company; and that, as soon as the injunction shall be removed, the coupons will be paid at the office of the Union Trust Company in New York,



the money having been earned by the road, and being now in the treasury for that purpose.

The first-mortgage bonds amount to \$2,000,000, but only a part of them have coupons falling due in November. The Cleveland, Columbus, Cincinnati & Indianapolis Company, which guarantees part of the bonds, gives notice that it will pay the coupons on all bonds bearing its guarantee on presentation to the United States Trust Company in New York.

On the other hand, Mr. W. Bayard Cutting, President of the St. Louis, Alton & Terre Haute Company, issues the following notice:

"To the holders of the first-mortgage bonds of the Indianapolis & St. Louis Railroad Company: The injunction referred to in a notice to you from Mr. H. B. Hurlburt, President, does not, as stated, restrain the payment of coupons on all the first-mortgage bonds above named, but only of the coupons on such of those bonds as are held by certain corporations specially designated in the injunction. And the order does not affect the rights of any bona fide holder."

**Kansas City, St. Joseph & Council Bluffs.**—The offices of the Treasurer, Assistant Treasurer and the auditors of freight and passenger receipts have been removed from St. Joseph, Mo., to Kansas City. It is said that the other general offices now in St. Joseph will soon follow.

**Land Grant Decision.**—In the case of the Southern Pacific Company, the Commissioner of the General Land Office at Washington, has rendered a decision involving the interpretation of the act of July 31, 1876, which requires land grant railroad companies before receiving patents to pay the costs of survey, selection and conveyancing. He holds that this requirement was a new burden or condition imposed upon the original grant, and that therefore it is applicable only to lands earned after the date of new enactments and not to any lands earned prior to that date. He also holds, incidentally, that this provision does not apply to any road in regard to which Congress did not reserve the right to amend the original grant, and also that it is not applicable to lands granted to a state to use in its discretion for the encouragement of construction of railroads.

**Louisville & Nashville.**—The Louisville Courier-Journal says of this company: "Mr. H. Victor Newcomb, Vice-President, of the Louisville & Nashville Railroad Company, returned home Saturday, from a visit to London, England, where he has been engaged in very important financial transactions connected with the corporation he represents. The particulars of Mr. Newcomb's negotiations have not transpired, but it is understood that he succeeded in making such arrangements with Messrs. Baring Bros. & Co. as will enable his company to liquidate the greater part of its floating debt, and thus place it in an easier and stronger financial condition than it probably has ever before enjoyed. The result of the negotiations can not be otherwise than most advantageous to the interests of the stockholders of the company and the market value of all its securities, and, in connection with the unprecedentedly large traffic now being thrown upon every part of the road, will not fail to greatly enhance the credit and prestige of Louisville's great corporation, in whose prosperity the city and all classes of citizens are so much interested."

**Milwaukee, Lake Shore & Western.**—In compliance with the decision of the Wisconsin Supreme Court that the general offices must be kept within the State, under penalty of forfeiture of charter, this company has made several changes in its officers, and will hereafter have its chief office in Milwaukee.

**Minnesota Midland.**—This road has passed into the hands of the Chicago, Milwaukee & St. Paul, and will hereafter be worked by that company as its Wabasha Division. The road, which has been chiefly built this year, is of 3-ft. gauge, and extends from Wabasha, Minn., west up the Zumbro Valley to Zumbrota, a distance of 40 miles.

**Missouri, Iowa & Nebraska.**—This company is now considering different lines for an extension westward from its present terminus at Centreville, Ia., but nothing has yet been decided.

**Mobile & Ohio.**—The Committee of Reorganization announces that an interest dividend of 3 per cent. on the amount of the new first-mortgage bonds to be issued will be paid at the office of the company in New York, Dec. 2, to holders of the provisional certificates issued for such bonds. This dividend will be in lieu of the coupon which would be due on the bonds, if issued.

**New York City & Northern.**—The Commercial and Financial Chronicle of Nov. 2 says: "The New York & Boston Railroad Company, through the Farmers' Loan & Trust Company, has transferred 531,062-3,230,835 shares of stock of the road to Jesse Seligman and John C. Brown, trustees, and 976,488-3,230,835 shares by Herman R. Baltzer and William G. Taak, receivers, to the New York & Northern Railroad Company, the consideration being 2,900 shares of the stock of the latter company at its par value of \$100 per share, and bonds of the company amounting to \$65,000. All claims of the old company against Seligman and Brown, trustees, are transferred to George H. Scott and Oliver H. Palmer, trustees, for 1,510 shares of the New York & Northern Railroad Company and \$34,000 in bonds, Seligman and Brown transferring to the new company their stock in the old road for 1,590 shares of common stock and \$35,000 of bonds in the reorganized company."

**New York, Lake Erie & Western.**—An additional force has been put at work on the third rail on the Delaware Division and in the Port Jervis yard. The Susquehanna shops are very busy on the switches and other necessary work for the additional rail.

**New York & Oswego Midland.**—The committee appointed by the holders of Receivers' certificates and the bondholders have, it is said, agreed on a plan of reorganization which provides for a mortgage of \$300,000 to pay necessary expenses of foreclosure, etc.; for the issue of preferred stock for the Receiver's certificates, and of common stock for the present first-mortgage bonds. The plan was to be submitted to another conference of the two committees this week, to complete its details.

At a recent meeting Mr. Stevens, Receiver and General Manager, submitted a report showing the total amount of certificates issued by the receivers to date as follows:

For vendors' liens on rolling stock purchased by the company	\$511,173
For rental of Utica and Rome railroads	284,905
For labor due employees of company	411,770
For labor due employees of receivers	144,706
Total	\$1,352,554
Interest on above accrued to Oct. 1	415,337
Total	\$1,767,892

In addition to the above there are outstanding Receivers' notes given for supplies amounting to \$120,000, and bills due which amount to about \$50,000. The Receiver also submitted a detailed statement and analysis of the earnings and expenses of the road for 1877. He estimated the gross earnings from Jan. 1 to Sept. 30, 1878, at \$558,000, and the operating expenses for the same period at \$518,000, leaving

a surplus of about \$40,000. He stated that all surplus earnings had been expended in improvements on the property, which, he said, was now in a much better condition than at any previous period of its existence. Mr. Stevens said that he thought that the future of the road did not depend upon through business, which might be obtained by connections or extensions, but upon the development of local traffic.

**New York & New England.**—This company on Nov. 1 paid the note of \$250,000 held by the state of Massachusetts, in accordance with the demand lately made by the state. The note was paid from the proceeds of the sale of bonds, and the company is now clear of debt to the state. The state, however, is still the largest stockholder, owning 38,000 shares.

**Nicaragua.**—Mr. Alexander I. Cothel, Consul General of Nicaragua, whose office is at No. 62 West Thirty-sixth street, New York, asks for proposals for the following material for a railroad of 3 ft. 6 in. gauge, to be laid with 40-lb. iron rails: Joints and fastenings for 300 tons of rails; one wood-burning locomotive for use on a construction and afterward on a passenger or freight train; eight flat cars; two hand cars; tools for a small repair shop. The engine and cars to have duplicate parts for repairs, and all tools and machinery to be adapted for use in a country where there are few or no facilities for mechanical work.

**Ohio & Mississippi.**—Receiver King's report for September is as follows:

Balance Sept. 1	\$13,790.26
Receipts from all sources	374,160.31
Total	\$387,950.57
Vouchers, etc., prior to Nov. 18, 1878	\$792.40
Vouchers, etc., subsequent to Nov. 18, 1878	336,801.49
	337,593.89
Balance, Oct. 1	\$50,356.77

The receipts were \$36,596.51 greater than the disbursements.

The United States Circuit Court has granted an order directing the Receiver to pay out of the earnings of the road the coupons on the first-mortgage bonds which became due July 1, 1878.

**Oil Transportation.**—An Oil City (Pa.) dispatch of Nov. 1 says: "The case of the Commonwealth vs. The United Pipe Lines, known as the *quo warranto* case, came up to-day before Judge Taylor, in the Court of Common Pleas, Venango County, when exhaustive arguments were heard on both sides, S. C. T. Dodd, of Franklin, and D. T. Watson appearing for the Pipe Lines, and Roger Sherman for the oil producers. Counsel for the Pipe Lines held that the Court of Common Pleas had no jurisdiction in the case, and that the amendment filed to the original suggestion by counsel for the oil producers was null and void, as it was not sworn to or signed by the Attorney General or Deputy. Mr. Sherman, for the plaintiff, cited numerous authorities to show that the case properly belonged in this court. He said it was not necessary that the suggestion be signed or sworn to. Judge Taylor reserved his decision until Nov. 11. This postpones a final disposal of the case until after the election, and the producers are uneasy to-night, as they think they see in this long delay an adverse decision."

**Omaha & Republican Valley.**—This road has been extended from the late terminus at David City, Neb., westward through Rising to County Line, 14 miles, making the road 75 miles long from the junction with the Union Pacific at Valley Station. It is controlled by the Union Pacific.

**Pennsylvania.**—In addition to the trustees under the new trust to be constituted by this company for the purchase of the securities of its leased lines, Messrs. Isaac H. Johnson and Wm. C. Longstreth have consented to act as actuaries or auditors of the accounts of the trustees. Both are large stockholders.

As generally expected, the company has resumed the payment of dividends after a suspension of a year and a half. The dividends hereafter will be half-yearly instead of quarterly, and the first one—of 2 per cent.—will be paid Nov. 30.

In announcing the declaration of the dividend the Philadelphia Ledger says: "As the Pennsylvania Railroad establishes 4 per cent. per annum in dividends, its stock (fifty dollar shares) will very naturally go to \$40 per share in the market, as at that price it will pay 5 per cent. per annum, a return that will invite investment to it, especially as the promise is steadily held forth of larger dividends from annually expected increase of business. The situation of the company, financially as well as in its working condition, is reported as now better than it has been at any time before in several years. Those stockholders who are dependent on dividends arising from the revenues of this company are to be congratulated on the arrival of the time when dividends may be announced, with reasonable assurance that they will be maintained and regularly paid. One good effect will follow the resumption of dividends by this company, and that is, the confidence that it will give to credit and to business generally, and especially the firmer tone that it will impart to the whole stock market."

**Peninsula.**—A correspondent reports that this road is now graded from Waldo, Fla., on the Atlantic, Gulf & West India Transit road, south to Ocala, about 40 miles. Ties are being cut and delivered along the first section of 20 miles, and the iron for that section has been ordered.

**Philadelphia & Atlantic City.**—The Court of Chancery has ordered the Receiver to pay by Dec. 1, one-half of the scrip notes issued by this company to its employees in settlement of their wages.

**Pine Hill.**—Track is now laid on this road from Pine Hill, on the Knoxville Branch of the Louisville & Nashville road, in Rockcastle County, Ky., west three miles to Tunnel, where a tunnel about 900 feet long has been begun. The road will be eight miles long, from Pine Hill to Skaggs Creek, and is built to reach several coal mines.

**Rio Grande.**—Serious damage was done to this road by recent floods, the road-bed in several places having been washed away. It has now been repaired and put in order, and regular trains are running between Brownsville, Tex., and Point Isabel.

**Sabine Pass & Northwestern.**—Local papers report that a contract has been concluded with Bliss & Christie, of Philadelphia, for the construction of the whole of this proposed road. The line is 340 miles long, from the Gulf of Mexico at Sabine Pass, Tex., northwest through Lawrence and Kaufman to Denison. The company had 50 miles graded nearly a year ago.

**Shenandoah Valley.**—Track is now laid to the Clark County (Va.) line, seven miles beyond the point last noted, and 13 miles from Duffield's on the Baltimore & Ohio, where track-laying was begun. The company is now building an over-grade crossing of the Baltimore & Ohio track at Duffield's station, and as soon as that is done, which will be early this month, the track will be laid to Shepherdstown.

**South Pacific Coast.**—This road is now running regu-

lar trains between Alameda, Cal., and the Southern terminus at Alma (formerly Los Gatos). Its two ferry boats also run regularly between Alameda and San Francisco. On the extension to Santa Cruz the track is laid to the third crossing of Los Gatos Creek, 2½ miles south of Alma, and tunnels No. 1 and 2 are finished. On tunnel No. 3, 1,913 feet have been excavated and on tunnel No. 4 about 1,246 feet. Ground has been broken at both ends of tunnel No. 5, which will be 910 feet long.

A proposition has been made to the company for an extension from Santa Cruz up the Salinas River and through the Panoche Pass into the San Joaquin Valley. Officers of the company have been examining the proposed line.

**Southern Pacific.**—The iron and other materials for the extension from Yuma up the Gila River in Arizona to Maricopa Wells have all been shipped, and it is expected that this section will be finished by Jan. 1. Arrangements are all made for the completion of the road to Tucson next year.

**Spartanburg & Asheville.**—In Charlotte, N. C., last week, application was made to the United States Circuit Court by counsel for the bondholders for the appointment of a receiver, and at the same time a bill in equity was filed to foreclose the mortgage. The company admitted the statements of the bill and its own insolvency, and the Court appointed Superintendent Anderson Receiver, pending the trial of the foreclosure suit, which was set for the December term. The company has been embarrassed by a large construction debt; it has its road now completed from Spartanburg, S. C., northwest to Flat Rock, N. C., 43 miles.

**Springville & Sardinia.**—The high trestle over Richmond Gulf was completed last week and the track has reached the town of Springville. The ballasting and finishing up is in progress and regular trains will be running over the road very soon. It is 11 miles long and of 3 feet gauge, from Sardinia Junction, on the Buffalo, New York & Philadelphia road, westward to Springville, N. Y. It has been built by Napier Brothers, contractors, and the whole work has been done within 90 days.

**St. Cloud, Grantsburg & Ashland.**—Work has been begun on the grading of this road from Grantsburg, Wis., west toward the St. Croix River. One section of six miles has been let.

**St. Johns.**—This company, which owns the short line from Tocol, Fla., on the St. Johns River, across to the old town of St. Augustine, is making arrangements to build a line from St. Augustine, southward through Daytona to Titusville in Volusia County, a distance of about 100 miles. Large tracts of land in Volusia County are owned by Northern capitalists, and it is said that many settlers are going to that part of Florida. The line will be between the St. Johns River and the Atlantic coast.

**St. Louis, Kansas City & Northern.**—The holders of St. Charles Bridge bonds have agreed to exchange their bonds for new ones to be issued directly by this company. The new bonds are to be secured by a special mortgage on the bridge, will have 30 years to run and will bear 7 per cent. interest for the first three years and 8 per cent. thereafter. The present St. Charles Bridge bonds are \$1,000,000 in amount, and bear 8 per cent. interest.

**St. Louis & Southeastern.**—Auditor Young's statement for September is as follows:

	St. Louis Div.	Ky. Div.	Tenn. Div.	Entire line.
Earnings	\$62,967.98	\$32,346.73	\$14,797.63	\$110,112.34
Expenses	40,405.02	26,576.79	12,015.30	78,997.01
Net earn.	\$22,552.96	\$5,769.94	\$2,782.33	\$31,105.23
Per cent. of exps.	64.13	83.08	81.18	71.82

As compared with September, 1877, there was an increase of \$2,006.31, or 1.9 per cent., in gross earnings, and a decrease of \$6,170.31, or 16.5 per cent., in net earnings.

In Nashville, Tenn., Nov. 1, the United States Circuit Court ordered to be entered a decree of foreclosure against the Tennessee Division. The decree directs the sale of the road unless all arrears are paid up by Jan. 1, 1879, and orders that the proceeds be applied: 1. To payment of costs of suit and sale. 2. To payment of \$289,000 Receiver's certificates issued under orders of Court. 3. To payment of \$1,008,000 bonds and \$446,292 interest under the mortgage of 1872. 4. To payment of \$4,922,000 consolidated bonds and \$463,611 interest, any surplus to be paid over to the company.

The Tennessee Division includes 37 miles of road from Guthrie, Ky., to Edgefield Junction, and a half interest in 10 miles thence to Nashville. It was originally the Edgefield & Kentucky road.

**Texas & Pacific.**—A number of arrests have been made since the exposure of the dishonesty in the local management of the freight business at Dallas. Everything has been kept as quiet as possible by the company; however, and the full extent of the robberies will not be known until the trial of the offenders, which will take place this month.

**Tomah & Lake Superior.**—This company has been organized to build a railroad from Tomah, Wis., northward to Unity, in Clark County, where it will connect with the Wisconsin Central. The distance is about 60 miles. The incorporators are John T. Mather, Aaron Newton, Fred. N. Newton, Mason A. Thayer and Romanza S. Skillman.

**Utica, Ithaca & Elmira.**—The track is now all laid on the extension of 15 miles from De Ruyter, N. Y., northward to Cazenovia. From Cazenovia, the company controls the Cazenovia, Canastota & De Ruyter road, which carries it 15 miles further to the New York Central at Canastota. The company began running its trains to Canastota Nov. 5.

**Valley, of Ohio.**—A little fight arising from resistance offered by the Atlantic & Great Western when this company attempted to lay its track under a trestle belonging to the other road near Akron, O., was quickly ended by the Court of Common Pleas. The Court ordered that the Valley Company should be allowed to make the crossing, and that no obstruction should be made to the laying of the track.

**Vicksburg, Shreveport & Texas.**—The general offices of this road, at Monroe, La., were burned, Oct. 26, with all the books and papers. The fire is supposed to be the work of some discharged laborers.

**Wilmington, Columbia & Augusta.**—A meeting of bondholders was held in Baltimore, Nov. 5, to consider what action was necessary to effect a foreclosure of the first-mortgage. After some discussion a committee was appointed and authorized to have the foreclosure ordered at as early a date as is practicable. Of the first-mortgage bonds nearly four-fifths are held in Baltimore.

**Wisconsin Central.**—In Milwaukee, Nov. 2, in the United States Circuit Court, Theodore Stern and Wm. Lawson, as representatives of the foreign bondholders, filed a petition for the appointment of a receiver. The complaint alleges that the annual interest charges are about \$165,000, and the net earnings do not appear to be more than \$120,000.



## ANNUAL REPORTS.

## Central Pacific.

This company's report for the calendar year 1877, gives the length of line worked at the close of the year as follows:

Owned:	Miles.
Main Line, San Francisco to Ogden.....	883.23
Oregon Division, Roseville, Cal., to Redding.....	151.45
Visalia Division, Lathrop to Goshen.....	146.30
Oakland and Alameda branches.....	15.54
San Jose Branch, Niles to San Jose.....	17.54
<b>Total.....</b>	<b>1,214.06</b>
Leased:	Miles.
Southern Pacific, Goshen to Los Angeles.....	242.60
" " Los Angeles to Yuma.....	248.70
" " Los Angeles to Wilmington.....	22.30
" " Goshen to Huron.....	40.00
<b>Total Southern Pacific.....</b>	<b>552.00</b>
Northern R. R. and Berkeley Branch.....	7.74
Northern R. R. Woodland to Williams.....	39.24
Los Angeles & Independence R. R.....	17.01
Amador Branch, Galt to Lodi.....	27.20
Los Angeles & San Diego R. R., Florence to Santa Ana.....	27.00
Stockton & Copperopolis R. R.....	49.00
California Pacific R. R. including Water route from San Francisco to South Vallejo, 20 miles.....	139.62
<b>Total worked.....</b>	<b>2,074.07</b>

Sidings on line owned were 171.41 miles, an addition of 6.84 miles during the year. The line owned was increased during the year by 0.18 mile, extension of Fruitvale Connection, included in Oakland and Alameda branches. The line leased was increased by the extension, at various times during the year, of the Southern Pacific from Indio to Yuma, 119.2 miles, and the opening of the Huron branch, 40 miles; the addition of 2.46 miles to the Berkeley Branch and the opening of 39.24 miles of the Northern road; the addition of the 17.01 miles of the Los Angeles & Independence road; the extension of the Los Angeles & San Diego road, 6.9 miles, from Anaheim to Santa Ana, and finally by the lease from July 1, 1877, of the California Pacific and the Stockton & Copperopolis roads, which had been previously controlled but not directly worked. The average mileage for the year was 1,783 miles, against 1,424 in 1876.

The railroad and floating equipment of the company is as follows, including that of leased lines:

	Owned.	Leased.	Total.
Locomotives.....	227	35	262
Passenger cars, all classes.....	189	37	226
Sleeping and parlor cars.....	41	1	42
Box cars.....	40	12	52
Baggage, mail and express cars.....	2,543	294	2,837
Flat cars.....	1,719	412	2,131
Caboose cars.....	73	3	76
Pay and other business cars.....	5	5	10
Wreck, tool, etc., cars.....	17	17	34
Hand and dump cars.....	552	208	760
Snow-plows.....	9	9	18
Floating:			
Ferry steamers.....	9	9	18
River steamers and tugs.....	13	2	15
Barges.....	14	12	26

The general account is as follows:

Stock (\$44,708 per mile owned).....	\$54,275,500.00
Funded debt (\$45,210 per mile).....	54,885,000.00
Trustees of land grant mortgage.....	850,042.81
Unclaimed dividends.....	10,798.00
Hospital fund.....	63,523.19
Government subsidy bonds (\$32,945 per mile).....	27,855,680.00
Profit and loss.....	8,656,466.02
Balances of accounts.....	5,618,238.07
<b>Total.....</b>	<b>\$152,221,238.09</b>
Construction.....	\$134,247,167.10
Equipment.....	7,693,671.22
Real estate.....	1,323,567.67
Shops.....	982,374.31
Machinery in shops.....	604,712.85
Furniture, telegraphic instruments, etc.....	147,126.81
Sacramento River steamers.....	715,301.10
<b>Total property accounts.....</b>	<b>\$145,773,921.00</b>
Sinking funds.....	2,067,557.43
Materials and fuel.....	2,189,590.54
Cash.....	1,290,169.06
<b>Total.....</b>	<b>\$152,221,238.09</b>

The mileage of locomotives for the year was as follows:

	1877.	1876.	Inc. or Dec.	P. c.
Passenger trains.....	1,046,190	1,570,435	I. 373,764	23.9
Freight trains.....	3,441,014	3,359,107	I. 82,507	2.5
Other trains.....	505,678	556,238	D. 50,560	9.1
Switching.....	720,903	710,474	I. 20,429	2.9
<b>Total.....</b>	<b>6,614,394</b>	<b>6,196,254</b>	<b>I. 418,140</b>	<b>6.7</b>
Cost per mile run.....	32.12 cts.	35.75 cts.	D. 2.63 cts.	7.4

The mileage made by the various classes of cars and the cost of repairs of the same were as follows:

	1877.	1876.	Cost of repairs.	1877.	1876.
Sleeping cars.....	1,727,252	1,926,878	4.84 cts.	2.87 cts.	
Passenger cars.....	5,011,547	4,010,134	2.51 "	2.30 "	
Baggage, mail and express cars.....	3,388,146	2,980,096	1.08 "	1.38 "	
Emigrant cars.....	2,384,931	2,542,677	1.42 "	1.27 "	
Officers' cars.....	89,800	47,293	0.62 "	1.28 "	
Freight cars.....	56,180,846	43,963,096	0.79 "	0.87 "	
Foreign cars.....	2,859,516	6,128,796	0.33 "	0.42 "	
<b>Total.....</b>	<b>71,651,038</b>	<b>61,599,570</b>	<b>1.07 cts.</b>	<b>1.03 cts.</b>	
C. P. cars on foreign roads.....	6,003,353	7,473,888			

The great decrease in mileage of foreign cars is noticeable. The passenger and freight business for the year was as follows:

	1877.	1876.	Inc. or Dec.	P. c.
Passengers, through.....	78,082	98,420	D. 19,738	20.1
Local, rail.....	1,080,233	691,282	I. 388,951	56.3
Local, rail and ferry.....	5,061,621	4,982,957	I. 78,664	1.6
<b>Total.....</b>	<b>6,820,536</b>	<b>5,672,659</b>	<b>I. 1,147,877</b>	<b>20.2</b>
Passenger mileage.....	181,699,547	172,002,504	I. 9,697,043	5.6
Av. rate per pass. per mile.....	3.02 cts.	3.34 cts.	D. 0.22 ct.	6.8
Tons local freight.....	971,078	925,311	I. 45,767	5.0
Tons through freight.....	173,240	188,774	D. 15,534	8.2
Tons comp. by freight.....	377,657	329,001	I. 48,656	14.8
<b>Total tons.....</b>	<b>1,522,572</b>	<b>1,443,086</b>	<b>I. 79,486</b>	<b>5.5</b>
Tonnage mileage.....	363,542,310	363,513,363	I. 28,947	0.1

This statement includes the California Pacific and Stockton & Copperopolis roads; excluding those lines the tonnage moved was: 1877, 1,415,588; 1876, 1,443,086; decrease, 27,498 tons, or 1.9 per cent. The local rail and ferry passengers are the passengers between San Francisco and Oakland or Alameda, whose average journey is not more than four or five miles. The changes in the freight traffic are noted as follows:

"Exhibiting for 1877, as compared with 1876, in local freight, a decrease of 5.39 per cent., or 99,542,294 pounds, and an increase in tons hauled one mile of 5.54 per cent. "In through freight a decrease of 8.23 per cent., or 31,069,478 pounds, and a decrease in tons hauled one mile of 8.23 per cent.

"Company's freight hauled, increased over previous year 11.41 per cent., or 75,087,180 pounds, and in tons hauled one mile 10.1 per cent.

"Exclusive of grain forwarded to the general markets, the local traffic shows an increase in 1877 of 4.67 per cent., or 71,001,181 pounds.

"There was a decrease in grain traffic of 51.52 per cent. tonnage, and 50.44 per cent. earnings of 1877, compared with 1876."

The earnings and expenses for the year were as follows:

	Earnings.	Coin.	Currency.	Total.
Freight.....	\$6,024,163.65	\$3,113,935.55		
Passenger.....	3,298,534.91	2,185,169.44		
Express.....	141,844.20	85,064.14		
Mail.....	2,443.44	270,866.21		
Miscellaneous.....	258,439.83	4,770.63		
Sleeping car.....	60,808.14	10,592.00		
Telegraph.....	122,042.28	10,786.50		
Rental.....	54,210.91	3,733.75		
Baggage.....	13,735.79	39,161.98		
Mileage.....	29,065.80	19,725.27		
Wharfage.....	25,952.00			
<b>Total.....</b>	<b>\$10,637,328.64</b>	<b>\$5,833,815.47</b>		<b>\$16,471,144.11</b>

	Expense of super-intendents.....	Station service.....	Telegraph service.....	Train service.....	Sleeping car service.....	Ferry service.....	Locomotive service.....	Snow service.....	Repairs of track.....	Repairs of snow-sheds.....	Repairs of bridges.....	Repairs of buildings.....	Repairs of docks.....	Repairs of engines.....	Repairs of cars.....	Leased railroads.....	Office expense.....	Stationery and printing.....	Advertising.....	Loss and damage to freight.....	Damage to persons and property.....	Miscellaneous.....	Water.....	Insurance and loss by fire.....	Mileage.....	Lighterage.....	Wharfage.....	Vallejo ferry.....	Taxes.....	<b>Total.....</b>
	\$67,675.53	502,160.79	198,070.39	505,571.95	24,972.42	371,432.47	1,788,978.35	50,490.30	1,733,533.40	9,353.83	84,445.07	83,066.46	28,775.17	434,403.47	769,313.69	304,458.05	194,650.17	28,968.27	13,553.02	23,113.87	24,335.72	55,827.50	73,752.37	76,332.62	4,545.78	39,060.11	10,368.80	126,962.34	26,504.41	<b>\$7,718,986.92</b>
																														<b>\$55,750.84</b>
<b>Total.....</b>																														<b>\$7,774,737.76</b>

Net earnings..... \$8,066,726.35  
Gross earn. per mile..... 9,237.88  
Net..... 4,877.58  
Per cent. of exps..... 47.20

The currency sold by the company during the year was sold at a discount equal to a premium on gold of 4.6 per cent.

The total earnings and expenses, coin and currency, compared with 1876 are as follows:

	1877.	1876.	Decrease.	P. c.
Earnings.....	\$16,471,144	\$16,094,216	\$376,928	2.3
Expenses.....	7,774,418	7,857,212	82,794	1.1
<b>Net earn.....</b>	<b>\$8,696,726</b>	<b>\$8,237,004</b>	<b>\$459,722</b>	<b>5.6</b>

A supplementary statement gives the earnings and expenses for the first half of the current year as follows, coin and currency:

	1877.	1876.	Inc. or Dec.	P. c.
Earnings.....	\$7,839,537	\$7,466,139	I. \$373,398	5.0
Expenses.....	3,630,861	3,926,124	D. 295,263	7.5
<b>Net earn.....</b>	<b>\$4,208,676</b>	<b>\$3,540,015</b>	<b>I. \$668,661</b>	<b>18.9</b>

The income account for 1877 was as follows:

Balance, Jan. 1, 1877.....	\$10,265,599.27
Net earnings for 1877.....	8,066,726.35
Interest on sinking funds.....	180,247.72
River steamers and barges.....	310,397.39
Cal. Pacific, net earn. to June 30.....	506,828.23
Land grant bonds redeemed from proceeds of land sales.....	572,000.00
<b>Total.....</b>	<b>\$20,294,926.84</b>

Interest..... \$3,716,983.65  
Taxes, general expenses, legal expenses, etc..... 981,061.65  
Discount on currency receipts..... 310,397.39  
Dividends Nos. 7 and 8..... 4,342,040.00  
Land Department expenses, less sales..... 13,610.30  
Stockton & Copperopolis, loss to June 30..... 8,183.37  
Leased railroads..... 2,266,186.48  
**Total.....** 11,638,460.82

Balance, Jan. 1, 1878..... \$8,656,466.02

The Chief Engineer's report notes the renewal of 123.6 miles of track with steel rails and the laying of 543,246 new ties. The road was fully maintained and many improvements made to bridges and buildings.

The Land Department reports for the year sales of 92,647.35 acres for \$1,203,870.14, and receipts of \$5,871.06 from rents and stumpage. The amount due on lands sold at the close of the year was \$1,508,640.19. A general improvement in value of lands is noted and a gradual increase in settlement.

President Stanford's report says: "At the last session of Congress there was passed what is known as the 'Thurman Bill,' which, in its provisions, is in conflict with the contract which your company made with the Government under the Act of 1862, and which, if constitutional, will seriously affect the welfare of the company. The company has always lived up to the spirit and letter of the contract, and the Government has never complained that it did otherwise. The company accepted the loan of the bonds of the Government at a time when they were far below par, in gold; and the road was so far completed as to give to the Government its use seven years earlier than the contract required, thereby saving to the United States annually a sum far in excess of what it has been called upon to pay out in interest. The company, with a due regard for its own welfare, could not have afforded to hasten the construction of the road as it did and accept the loan of these depreciated bonds, except upon the theory of a contract—which has been sustained by the Supreme Court of the United States—that it would not be called upon to pay the interest until the maturity of the bonds. For that purpose the company has already provided a sinking fund, but until the constitutionality of the Thurman bill can be determined, that sinking fund must be held in abeyance. Under the theory of that bill, the aid derived by the company from the Government, instead

of having been a benefit, would prove a serious injury. It would have been far better for the company to have taken the full time for the completion of its road, relying upon its own means and credit, than to have accepted the so-called Government aid.

"We are advised by counsel that the Thurman bill is as clearly unconstitutional as it is unquestionably unjust. Aside from the clear legal meaning of the acts of 1862 and 1864, the debates upon their passage show the intention of Congress, and also show that the construction placed upon these acts by your company is correct. A just regard for the rights of your company will make it the duty of your board of directors to test the constitutionality of the Thurman bill, unless otherwise instructed by the stockholders.

"The recent ruling of the Secretary of the Interior in relation to the right of settlers to preempt the lands granted to the company, if legal, would bear with much hardship upon the interests of the company; but we are advised by counsel that, under the law, illustrated by a recent decision of the Supreme Court of the United States, his ruling is not legal, and that the interests of your company cannot be seriously jeopardized thereby. The equities are clearly with the company. It has always been ready to dispose of its lands, at reasonable rates, adopting, as a rule, a valuation about 25 per cent. below what similar lands, similarly located, are held by private parties. It has been impossible for the company to sell all its lands, and more particularly the very large portion that was withheld from the company by the Government until October, 1874, as security for the completion of the road according to contract.

"It was deemed advisable by your board of directors, in view of the passage of the Thurman bill, not to declare the usual April dividend. In this action the board was also influenced by a desire to extinguish the floating debt of the company, represented by additions and increased betterments to the company's property. Your company can point with just pride to its history as sustaining the statement that it has always lived up to its contracts with the utmost good faith, and it asks for nothing further from other parties, whether individuals or the Government."

## Grand Trunk.

The report of this company for the half-year ending June 30, 1878, covers the whole system of 1,390 1/4 miles worked, comparisons being made with the corresponding half of 1877, when there were 1,388 1/4 miles worked.

The earnings for the half-year were as follows:

	1878.	1877.	Inc. or Dec.	P. c.
Gross earnings.....	\$283,807	\$274,711	I. \$9,096	3.3
Less discount on American currency.....	2,804	14,325	D. 11,521	80.6
<b>Balance.....</b>	<b>\$281,003</b>	<b>\$260,386</b>	<b>I. \$20,617</b>	<b>7.9</b>
Working expenses.....	607,253	684,467	D. 77,214	11.2
<b>Net earnings.....</b>	<b>\$274,750</b>	<b>\$175,919</b>	<b>I. \$98,831</b>	<b>56.3</b>
Postal and military bonds.....	540	16,596	D. 16,056	96.7
<b>Net balance.....</b>	<b>\$274,210</b>	<b>\$159,323</b>	<b>I. \$114,887</b>	<b>72.4</b>
Per cent. of expenses.....	75.73	77.33	D. 1.60	1.9

From this balance payments were made as follows:

Net balance.....	\$212,542
Interest on temporary loans, Montreal Seminary and Island Pond debentures, etc.....	\$9,013
Rentals of leased lines.....	108,674
Equipment bonds and perpetual debentures.....	94,855
<b>Total.....</b>	<b>\$212,542</b>

Balance for the half-year.....	\$208
Balance, Jan. 1.....	\$249,953
March dividend on first preference stock.....	48,224
<b>Total.....</b>	<b>\$212,542</b>

Balance, July 1, 1878..... \$2,397

Passenger receipts showed a decrease of \$23,911, or 1.6 per cent., and freight traffic an increase of \$12,815, or 2.2 per cent. Reduced to American currency the earnings were \$3,109 gross, and \$754 net per mile. The passengers and freight carried were:

	1878.	1877.	Inc. or Dec.	P. c.
Passengers carried.....	876,301	865,972	I. 10,329	1.2
Tons freight carried.....	1,156,045	1,032,873	I. 123,172	9.8
Av. receipt per passenger.....	5a. 44c.	5a. 64c.	D. 2 c.	3.0
Av. receipt per ton.....	10s. 45c.	11s. 2 d.	D. 9c.	7.1

The working expenses were divided as follows:

	Amount.	P. c. of earn.
Repairs and renewals.....	\$235,096	23.5
Working the road.....	431,557	48.9
<b>Total.....</b>	<b>\$666,653</b>	<b>72.4</b>

The decrease in expenses of working the road was made in spite of an increase in amount of traffic, as shown by an increase in car mileage of 4,773,980 miles, or 7.2 per cent.

The receipts in United States currency were \$3,330,882, against \$3,722,274, of which \$867,470 were converted into gold, against \$1,150,092 in 1877, the average rate being 101 1/2 against 106 last year.

During the half-year \$1,049,959 5 per cent. perpetual debenture stock has been issued, principally for the exchange or redemption of pre-preferential securities, and the following have been thus absorbed:

Postal and military service bonds for.....	\$1,150,800
Montreal & Champlain 8 per cent. second mortgage bonds.....	70,027
First equipment 6 per cent. mortgage bonds.....	78,700
International Bridge bonds 6 per cent.....	45,400
Sundry mortgages 6 per cent.....	8,295
<b>Total.....</b>	<b>\$1,353,222</b>

By the Grand Trunk Consolidated Debenture Stock Act, 1874, it is provided as follows: "From time to time and when any preferential charge shall be purchased, exchanged, redeemed or otherwise required by the company, the interest or annual income which would otherwise have been or become payable in respect of such preferential charge shall thenceforth be applied in aid of the interest payable on the